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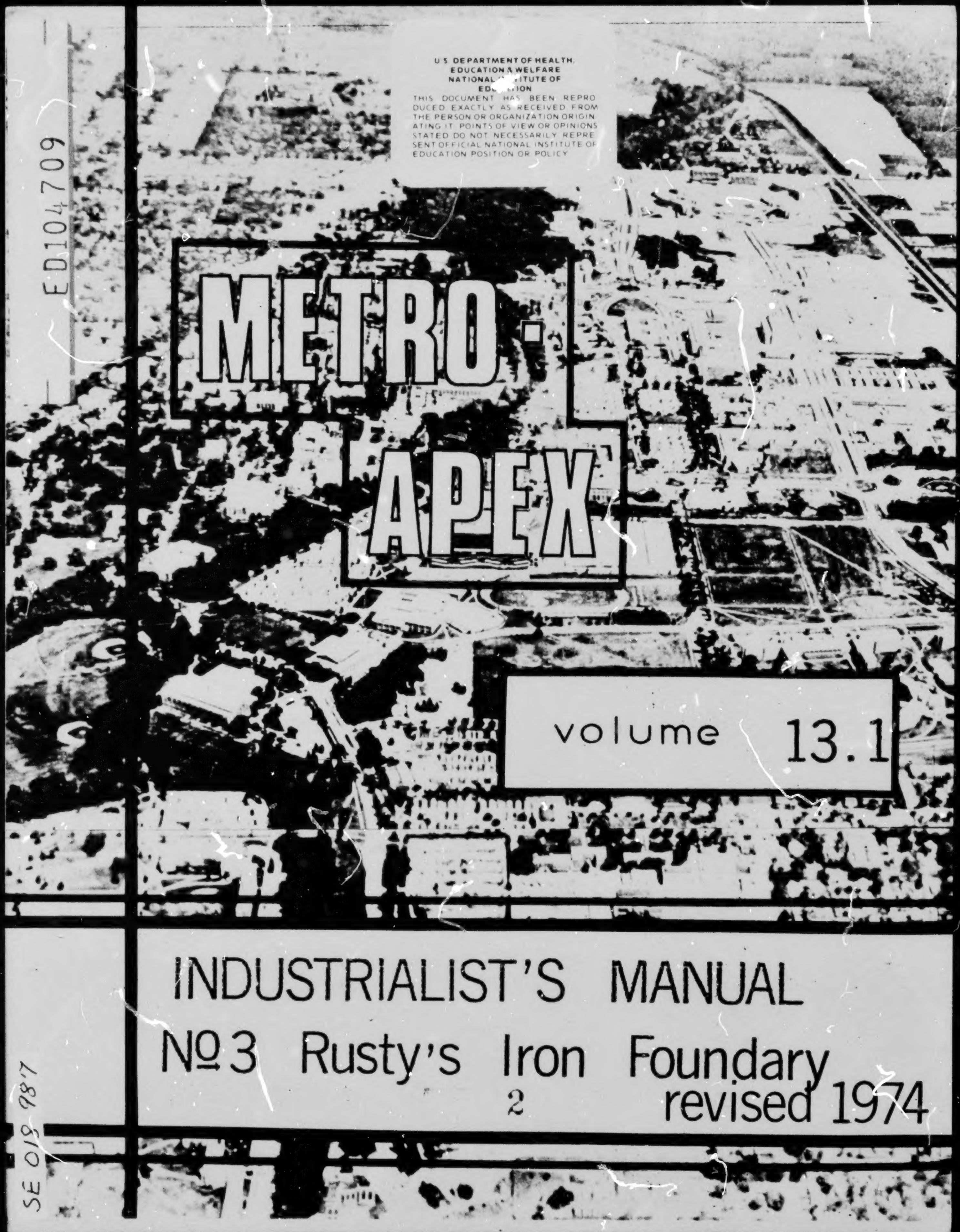
ABSTRACT

The Industrialist's Manual No. 3 (Rusty's Iron Foundry) is one of a set of twenty-one manuals used in METRO-APEX 1974, a computerized college and professional level, computer-supported, role-play, simulation exercise of a community with "normal" problems. Stress is placed on environmental quality considerations. APEX 1974 is an expansion of APEX--Air Pollution Exercise (ED 064 530-550; ED 075 261; ED 081 619), and includes roles for an environmental quality agency, water quality manager, solid waste manager, and various pressure groups, in addition to the previously developed roles of city and county politicians, city and county planners, air pollution control office, developers, industrialists and newspaper. Two industries have been added, as have a number of program options. The participants may range in number from 17 to 100. Each run of the game should consist of at least three cycles (simulated years), the optimum being five cycles. Each cycle should span at least a three-hour period. A cycle is composed of two major phases: the first is the game simulation; in the second phase, decisions emerging out of the game simulation are analyzed by a computerized system of integrated simulation models. The METRO-APEX computer program is in Fortran IV and runs on an IBM 360-50 or higher series computer. (BT)



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METRO-APEX

volume 13.1

INDUSTRIALIST'S MANUAL

№3 Rusty's Iron Foundary

revised 1974

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METRO-APEX

1974

A Computerized Gaming Simulation Exercise
For Training in Environmental Management
and Urban Systems

Developed by the
COMEX Project
University of Southern California

through a grant form the
Control Programs Development Division
Environmental Protection Agency

A revised version of the APEX Air Pollution Exercise
developed jointly by the
COMEX Project, University of Southern California
and
Environmental Simulation Laboratory, University of Michigan
June 1974

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PREFACE

PREFACE

METRO-APEX is the result of a long term research and development effort by a number of dedicated individuals. The inspiration, and much of the technical basis evolved from a similar exercise (M.E.T.R.O.) originally developed by the Environmental Simulation Laboratory, University of Michigan. In 1966, a grant from the Division of Air Pollution Control, U.S. Public Health Service was awarded to the COMEX Research Project, University of Southern California, to develop a dynamic teaching instrument, METRO-APEX. Working in close cooperation, the COMEX Research Project and the Environmental Simulation Laboratory successfully developed the initial version of the METRO-APEX exercise in 1971. This computer-based gaming simulation was designed to provide a laboratory urban community in which air pollution management trainees could apply and test the knowledge and skills gained through conventional educational methods.

METRO-APEX has proven to be highly adaptable to training programs dealing with the many aspects of air pollution control including law, management, air quality monitoring, land use planning, budget preparation, citizen participation programs, state and federal grant procedures, and political decision-making processes. As a result, METRO-APEX is in great demand as a valuable supplement to university training programs, and in many cases is being used as a central curriculum focus. Over 60 universities have been trained in the use of METRO-APEX. It has also been translated into French and Spanish and is being used in seven countries outside of the United States.

Based on the success of the initial METRO-APEX program, COMEX was awarded a grant from the Control Programs Development Division of the Environmental Protection Agency to substantially revise and broaden the simulation exercise to encompass the wide spectrum of environmental management issues. This current version, of which this manual is a part, was completed in June 1974 and greatly increases the utility and teaching potential of the exercise. In this version, the interrelationships among air, water and solid waste are demonstrated, the strategies and options available to players have been broadened, new roles have been added, the exercise materials have been updated to reflect the latest technology and nomenclature, and many of the operational problems associated with the earlier version have been rectified.

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METRO-APEX is one of, if not the most complex gaming-simulations of an urban area in use today. Although it was designed to supplement standard teaching methods, APEX is far more than an educational tool. It is a communication channel of a new level--capable of providing both the language and the forum for information transfer between persons and groups with different educational and cultural backgrounds as well as different perspectives of the urban situation.

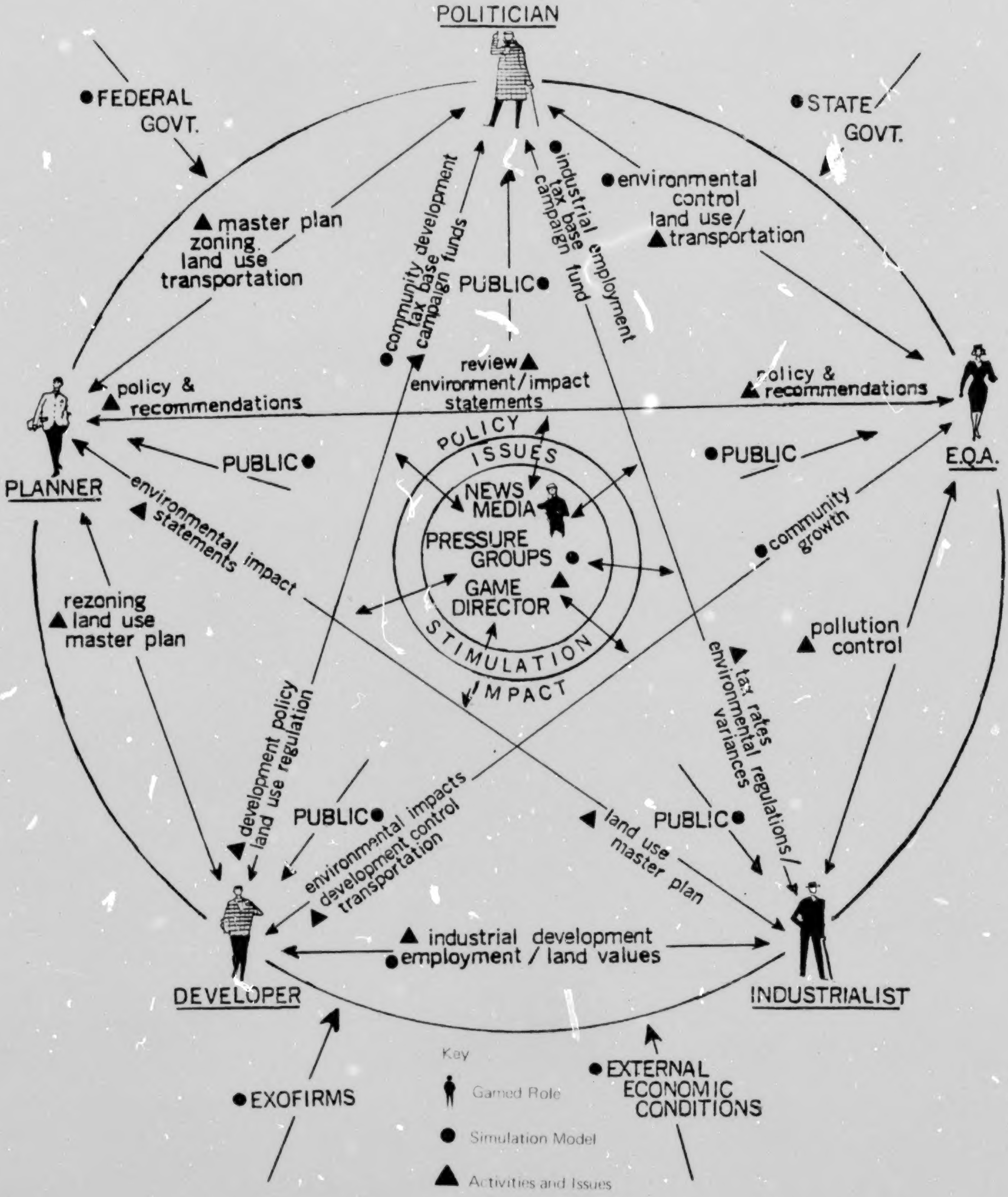
METRO-APEX is composed of two essential components: (1) a computerized system made up of a series of well-integrated simulation models linked to a (2) "gamed" environment encompassing a series of interactive roles. The computerized system predicts the changes that occur in several sectors of the urban system in response to the decisions made by participants in the "gamed" environment, decisions made by persons outside the "gamed" environment (other actors whose behavior is simulated in the computer), and external pressures on the metropolitan area (also simulated in the computer).

The County of APEX is run year by year by principal decision makers performing both the mundane and extraordinary functions of their office in the "gamed" environment. Each cycle or year is condensed in time to a three to eight hour session during which the decision makers formulate their yearly policy. The decisions that emerge out of the "competitive--cooperative" environment of the gaming-simulation are used as priming inputs to the computer simulation. The change in the status of the urban area is calculated by the computer and returned to the decision makers as the primary input to the next cycle of action. Included in the change picture generated by the computer are selected social, economic and physical indicators which show the magnitudes of change in key areas and a newspaper which serves as the focal point of local public opinion.

The key decision makers acting in the gamed environment include an Environmental Quality Agency with departments of Air Pollution, Water Pollution and Solid Wastes; Politicians, Planners and Administrative Officers from a Central City and a County; Land Developers and Industrialists from the private sector; and representatives from the News Media and Pressure Groups. The Politicians are responsible for the administration of their respective jurisdictions and for the formulation and implementation of various programs to upgrade the social status of their constituents. The Planners serve as aides to the Politicians and represent the major long range coordinating force in the community. The Environmental Control Officers are charged with the task of monitoring and alleviating the pollution problems. The private business sectors operate to foster their own interests and frequently those of the community. Pressure Groups and News Media advocate various positions on community issues. Generally, each decision maker finds it to his advantage to coordinate and/or compete with other players in his efforts to promote his strategies. The METRO-APEX General Interaction Diagram included here indicates possible linkages among the roles.

In general, people have great difficulty understanding the dynamics of a complex system through traditional means. Gaming-simulation offers participants the opportunity to study, work with, and discuss the structure of such a system and to experiment with intervention strategies designed to change that structure. When used as a teaching device, the strength of a gaming-simulation such as METRO-APEX lies in the opportunity afforded participants for involvement in the system. When compared with the passive observation of the system offered by traditional methods, this approach has had great success.

METRO-APEX INTERACTION DIAGRAM


POLITICIAN
● FEDERAL GOVT.
● STATE GOVT.
▲ master plan zoning land use transportation
● community development tax base campaign funds
PUBLIC ●
● industrial employment tax base campaign fund
● environmental control land use/ ▲ transportation
review ▲ environment/impact statements
▲ policy & recommendations
policy & ▲ recommendations
PLANNER
E.Q.A.
PUBLIC ●
● PUBLIC
POLICY
ISSUES
NEWS MEDIA
PRESSURE GROUPS ●
GAME DIRECTOR ▲
STIMULATION
IMPACT
▲ environmental impact statements
● community growth
rezoning ▲ land use master plan
▲ pollution control
▲ development policy land use regulation
▲ tax rates environmental regulations/ variances
PUBLIC ●
● environmental impacts development control ▲ transportation
▲ land use master plan
PUBLIC ●
▲ industrial development ● employment / land values
DEVELOPER
INDUSTRIALIST
● EXOFIRMS
● EXTERNAL ECONOMIC CONDITIONS
Key
Gamed Role
● Simulation Model
▲ Activities and Issues

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CHAPTER 1

A Brief Description of APEX County

Chapter 1

A BRIEF DESCRIPTION OF APEX COUNTY

History

The first settlers of APEX County were farm families emigrating from New England and New York State beginning about 1830. During the middle of the nineteenth century, German immigrants continued the settlement patterns of established dispersed family farms. Income to pay for the necessary imports of products from the East was derived primarily from the production of farm crops and, more importantly, timber. Small market towns, often containing milling facilities, developed between 1820 and 1860. At the same time, the County was organized as a unit of government by the State, and the basic network of roads was completed.

The major impetus for the later development of the Central City as a regional center was its selection as the state capitol in 1847. The nation's first land-grant university was established east of the Central City in 1855, further enhancing its growth. Central City was incorporated in 1859 and the Suburb, in which the university was located, was incorporated in 1910. The University's control of a large block of land was to exercise profound influence on the future physical pattern of development. Much of the logical development corridor outward from the City was preempted by this facility.

Steam railroads were first built into APEX County beginning in the 1860's. Those small market-milling communities with stops and depots on the rail lines began to assume a greater importance than the small communities away from the lines. The impact of the railroads on the small communities can be seen from the following description of Central City:

> By the year 1863, the City...was a bustling, urban center. Early accounts tell us that, at that time, the City included eleven churches, five hotels, two flouring mills, three tanneries, two breweries, three saw mills, two sash and blind factories, three iron foundries, two printing offices, several brick yards, and a large number of mechanic shops.*

Although growing, it should be noted that manufacturing was still minimal. Exports were dominated by agricultural and timber products, and most other production was for local consumption only.

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*Tri-County Regional Commission, "History of the Tri-County Region," Information Report 7, updated. pp. 24-25.

Beginning in perhaps 1880, factories producing goods to be exported out of the region were built in the area, fostered by the completion of railroad ties with the rest of the country. These factories, mainly built near railroad depots, stimulated the migration of factory-worker families into the region. Most of these families settled near the factories where they were employed, adding further to the growth of the towns near the railroad. Just before the turn of the century the introduction of the automobile industry into Central City gave the final impetus needed to make Central City into the dominant community in the County. Beginning about the same time, electric interurban railways were extended from Central City to the north, east and west, allowing many workers from the new industries in the City to move further away from their place of employment.

By the 1920's, automobiles had become readily available and their use was encouraged by the paving of most of the roads in the County. Those who had formerly lived fairly close to the interurban system began to be dispersed throughout larger areas and to settle in lower density neighborhoods. Until about 1930, most new development was found in the filling-in of the Central City and Suburb. Although the growth of industrial and bureaucratic functions proceeded in the Central City and the area adjacent to it, the more outlying townships remained, and to some extent still remain, predominantly agricultural. The growing urbanization which has occurred more recently in these fringe areas has been primarily stimulated by the construction of the interstate expressway system beginning in the 1950's.

The interstate highway freeway system in APEX County is shown on the map at the end of this chapter. One major expressway comes from the southeast, sweeps around the southern and western fringes of the City and leaves the County from its northwestern corner. A second expressway comes up from the south, intersects the first and continues northward into the Suburb. It is anticipated that in the future this expressway will be continued northwards, then swing west to finish an expressway loop around the City (dashed line).

In addition to the airport, major transportation into and out of APEX County is provided by rail (primarily freight) and expressway. The attached map outlines the routes of the three rail lines, which generally follow the river valleys and intersect in Analysis Area 8.

A local APEX bus line serves the Central City, with some service extended into the Suburb and nearby areas of the County.

Most travel in APEX is currently by private automobile. There are approximately 2.1 people per registered automobile in APEX. This amounts to approximately one billion automobile miles per year. The automobile is the cause of substantial congestion, property damage, death and air pollution in APEX. Further information about the contribution of the automobile to pollution can be obtained from the Air Pollution Control Officer.

The automobile represents an immense financial burden to owners, political jurisdictions, employers and commercial establishments. Taxes to expand and maintain the road network are constantly expanding. Vast areas of land are required for parking. At the same time, bus ridership is decreasing.

Political Jurisdictions

In the METRO-APEX game, the County is composed of four autonomous jurisdictions: The Central City, Suburb, Township 1 and Township 2. The County has been further divided into 29 "Analysis Areas", each resembling a census tract. The Central City comprises Analysis Areas 1 through 13; the Suburb, AA's 17 through 19; Township 1, to the west, contains AA's 23 through 28 and Township 2, to the east, contains AA's 14-16, 20-22 and 29. (See map). In addition to analysis areas, the Central City is politically divided into Wards:

Ward 1 -- AA's 1-4
Ward 2 -- AA's 5-8
Ward 3 -- AA's 9-13

Each Ward is the electoral district for one of the three City Council seats represented in the game. The County government (Board of Supervisors) is comprised of members elected from the Suburb, from the Townships, from the County-at-large and the Central City-at-large.

The City Council and County Board of Supervisors are the only two local governmental units actively represented in the game. Other local governments, including the school boards, are simulated. In some cases, City and County governments have parallel functions; e.g. they both provide police services, planning and capital improvements. The County however, has area-wide responsibility for three major services not provided by the City government: public health, welfare and pollution control. In these three areas, County actions, directly affect Central City residents as well as residents in the outlying areas. Both the municipal and County governments derive their primary financial support from the same tax base--real property. County property taxes are paid by land-owners, in addition to property taxes collected by the municipal government and the school board in each political jurisdiction.

Data provided to players in the game are nearly always given by analysis area--this is also the smallest unit of scale in referring to locations; that is, a project or house or industry is located in "Analysis Area X" rather than on a particular street or a particular intersection. Characteristics of each individual analysis area, including the socio-economic composition of the residents and the proportions of land area devoted to particular land uses, may be found in the Planners data.

A few analysis areas are almost completely chacterized by one or two major features which are often referred to throughout play. These major features are given in the following list, with their analysis areas indicated:

Central Business District (CBD) -- nearly all of Analysis Area 8

State Capitol -- Analysis Area 8

Ghetto -- Analysis Area 4 and Analysis Area 8

University -- Analysis Area 19 (all)

"Best" residential areas -- Analysis Areas 9 (all) and 17 (most)

These features are not only unique in the County, but they also dominate the analysis areas in which they are located; in the game they are likely to be referred to as locations in themselves, with no further locational explanation given.

A list of other important man-made features of the County, and their locations, is given later in this chapter.

Geography and Climate

APEX County is located nearly at the center of an industrialized northern State, some 85 miles northwest of one of the largest metropolitan areas in the United States. The once heavily forested land, extending roughly 320 square miles, is quite flat and for the most part adequately drained for agriculture.

The Great River, a major watercourse in the State, enters the County from the south in Analysis Area 23, meanders north and west, then back to the east and north as it passes through Analysis Area 8. There it is joined by the Red Oak River, which comes in from the east. The enlarged Great River exits from the County in Analysis Area 26, from which it continues west for some 85 miles before emptying in to the Great Lakes. Major drainage of the County is through the Great River system.

Just before it empties into the Great River, the Red Oak River is joined by Sycamore Creek, which wanders up from the southeast. Much of the area in Analysis Areas 11 and 13, near this creek, is low and somewhat marshy, not ideal for heavy development. The other major marshy area in the County is in Analysis Area 14, to the northeast in Township 2. There are also several small lakes in this analysis area and quite a large State Park. The largest lake in the County is located in Analysis Area 16. This was a primary recreation area in the early part of this century but is less ideal now, due to heavy pollution loads and deteriorating shoreline development. There are small creeks which wander through many analysis areas in the County. The only other river of any significant size, however, is Looking Glass River, which runs east and west through the northern portion of the County, primarily in Analysis Areas 28 and 29.

The climate of APEX County is temperate, with summer temperatures averaging about 70 degrees and winter temperatures which average about 25 degrees. There is an annual rainfall of roughly 41 inches, with heavy snows to be expected primarily in the months of January and February. Prevailing winds are westerly, swinging to the southwest in summer and northwest in winter.

Major Public Facilities

As might be expected, the Central City and Suburb are significan ly better endowed with public capital improvements than are the Townships. The following list includes the most important public structures in the County, and indicates under whose jurisdiction they are operated and where they are located:

Airport (County) -- AA 29, just outside the City limits. The Airport has three runways and a terminal of 27,000 square feet. Two commercial airlines serve the County through this airport; cargo and general aviation are also served.

Boys Training School (State) -- AA 7.

City Hall -- AA 6. This is an old structure, built 80 years ago and considered a scandal. A more central location has been chosen for the new City Hall under construction in AA 8.

Community Centers (City) -- AA's 2, 4, 7, 8, 10, 13. These are mostly old houses purchased by the City to house neighborhood meetings and the operation of special programs.

Community Centers (Township Halls) -- AA's 14 (2), 24, 27, 29.

Community College (County) -- AA 8. The facility is currently housed in an old library and elementary school.

County Building -- AA 8, This includes all County offices and the meeting rooms for the County Board of Supervisors.

County Court House -- AA 8, adjacent to County offices.

Fire Stations (City) -- AA's 2, 3, 4, 5, 6, 8 (2), 11, 12.

Fire Stations (Townships) -- AA's 20, 23, 25. These are modest stations housing limited equipment. Volunteers provide firefighting manpower.

Hospital (County) -- AA 7. This was built in 1912 and was expanded in 1922, 1942, and 1960. It contains 362 beds, including a 35-bed tuberculosis wing, and caters primarily to the indigent. There are three private hospitals in the County with an additional 650 beds.

Library (City) -- AA 8. This is an old downtown building. There are branch libraries in AA's 1, 5, 11, 12 (2), 13.

Library (Suburb) -- AA 18.

Sewage Treatment Plant (City) -- AA 2. This plant provides both primary and secondary treatment and has a capacity of 34 million gallons per day. It currently averages 22 million gallons daily.

Sewage Treatment Plant (Suburb) -- AA 19. This plant provides primary sewage treatment, with a capacity of 12 million gallons per day; it currently handels an average of 6.75 million gallons daily.

Sheriff Station (County) -- AA 8. This is attached to the County Building.

Water Treatment Plant (City) -- AA 8. Water for the City is derived from the Great River as it exits from Analysis Area 8. Capacity is 42 million gallons per day, with the average daily flow currently being 22 million gallons. Treatment includes filtration, purification, flouridation and lime softening.

Water Treatment Plant (Suburb) -- AA 19. The Suburb's water is drawn from the Red Oak River as it enters AA 19. Capacity is 6 million gallons daily, with current average flow being 2.5 million gallons per day. Treatment includes chlorination, fluoridation and ziolite softening.

Zoo (City) -- AA 7.

Industry and the Economy

Major employment in APEX County is provided by the State Capitol Complex, the University and a automobile assembly plant, located in Analysis Area 4. While State Government is a stable, slow-growing industry, the University, typical of "research and development" operations elsewhere, is growing at a very rapid rate. The automobile plant exhibits characteristics similar to any large manufacturing operation, fluctuating considerably in response to the national business cycle.

In addition to these "big three" employers, there is a host of industries supplying parts to the automobile industry, as well as independent industries exporting goods which have no relationship to autos. (A map and listing of the major industries in the County are found on the following two pages.) These include the seven gamed industries:

Industry 1 -- Shear Power Company
Industry 2 -- People's Pulp Plant
Industry 3 -- Rusty's Iron Foundry
Industry 4 -- Gestalt Malt Brewery
Industry 4 -- Caesar's Rendering Plant
Industry 6 -- Dusty Rhodes Cement
Industry 7 -- Schick Cannery

Members of the population of APEX County constitute a work force of about 101,000 people, nearly half of them employed by the major "exporting" industries previously mentioned. About 9% of total County employment is found in lighter industry and 41% in commercial and service activities for the resident population. The greatest concentration of manufacturing employment is, as expected, found in the Central City. The highest proportion of white collar workers is in the Suburb, due to the predominance of the University as an employer there. In the futute, it is probable that more and more new industrial growth and employment will occur in outlying areas, particularly among firms requiring significant amounts of land for their plants.

Population

Within the physical and political environment described in the preceding pages resides a population of some 227,000 persons, a tiny fraction of whom are represented in METRO-APEX as players. The remainder of the population is simulated by the computer in the game. About 63% of the population resides in the Central City, 10% in the Suburb and the remainder in the two Townships.

Only about 9.2% of the County's population is black; however, virtually all of this population is found in the Central City, of which 14.4% of the total population is black, primarily in Ward 1, where the number of non-white households approaches 38%. The only other significant ethnic minority is found in a Mexican-American community in the east-central portion of the city.

For purposes of the game, the population of APEX County has been divided into five "household types", each representing different occupations and educational achievements, life-styles, voting habits and consumption behavior. These will be described briefly here; more detailed information about each may be found in the Glossary.

Household type 1 is a combination of upper and upper-middle class families whose head of household are likely to be employed in the professions and business management. Household type 2 is typical middle class, occupations usually clerical and lower-level public service areas. Household type 3 includes very low white-collar workers and skilled craftsmen and shop foremen, the latter two predominately. While members of household types 1 and 2 have attended college, some with advanced degrees, household type 3 members are typically high school graduates. In outlying areas, farmers are included in this latter type. In household type 4 are found semi-skilled workers and non-domestic service workers. Usually household heads have not completed high school, and while many household type 4's are homeowners, the value of their housing is quite low. Household type 5 includes laborers, domestic workers and the unemployed, with a large number of the elderly. A majority of these households live in rental units of low value.

Initially, about 17.5% of the County population is found in household type 1, 16% in household type 2 and 27% in type 3; about 32% is of household type 4 and 7.5% fall into household type 5. The household composition of a particular analysis area, and of an entire jurisdiction, will affect significantly the demand for both public and private goods and services. It will also affect voting behavior on financial issues and in elections.

List of Major Industries

1. Shear Power Company (A.A. 8)
2. People's Pult Plant (A.A. 2)
3. Rusty's Iron Foundry (A.A. 5)
4. Gestalt Malt Brewery (A.A. 27)
5. Caesar's Rendering Plant (A.A. 12)
6. Dusty Rhodes Cement Company (A.A. 23)
7. Schick Cannery (A.A. 3)
8. Municipal Incinerator (A.A. 10)
9. Humpty Dump (A.A. 15)
10. Flies Dump (A.A. 26)
11. Auto Assembly Abel (A.A. 4)
12. Auto Assembly Baker (A.A. 4)
13. Auto Assembly Charlie (A.A. 6)
14. Wolverine Forging Plant (A.A. 7)
15. Finch's Forging Plant (A.A. 6)
16. Smithy's Forging Plant (A.A. 2)
17. Ahead Forging Plant (A.A. 6)
18. Wordy Printing Company (A.A.6)
19. Bogus Printing Company (A.A. 6)
20. Boylan's Fertilizer (A.A. 2)
21. Peter's Water Heaters (A.A. 7)
22. Tar Heel Asphalt Paving (A.A. 8)
23. Concrete Batching (A.A. 12)
24. Spartan Galvanizing Company (A.A. 8)
25. Monkey Brass Melting Company (A.A. 5)
26. Trojan Varnish Manufacturing (A.A. 10)
27. Hannah Feed and Grain (A.A. 1)
28. LaRue Soap and Detergent (A.A. 1)
29. Acme Dry Cleaning (A.A. 4)
30 Trojan Dry Cleaning (A.A. 7)
31. Losten Foundry -- Iron (A.A. 5)
32. Dusty's Cement Products (A.A. 3)
33. Rembrants Rendering (A.A. 27)
34. Wiffenpoof Fertilizer (A.A. 1)
35. Saint Andre Asphalt Paving (A.A. 15)
36. Oriental Concrete Batching (A.A. 20)
37. Daily Journal Printing (A.A. 7)
38. Tiger Body Assembly (A.A. 3)
39. Academic Feed and Grain (A.A. 13)
40. Spotless Dry Cleaning (A.A. 11)

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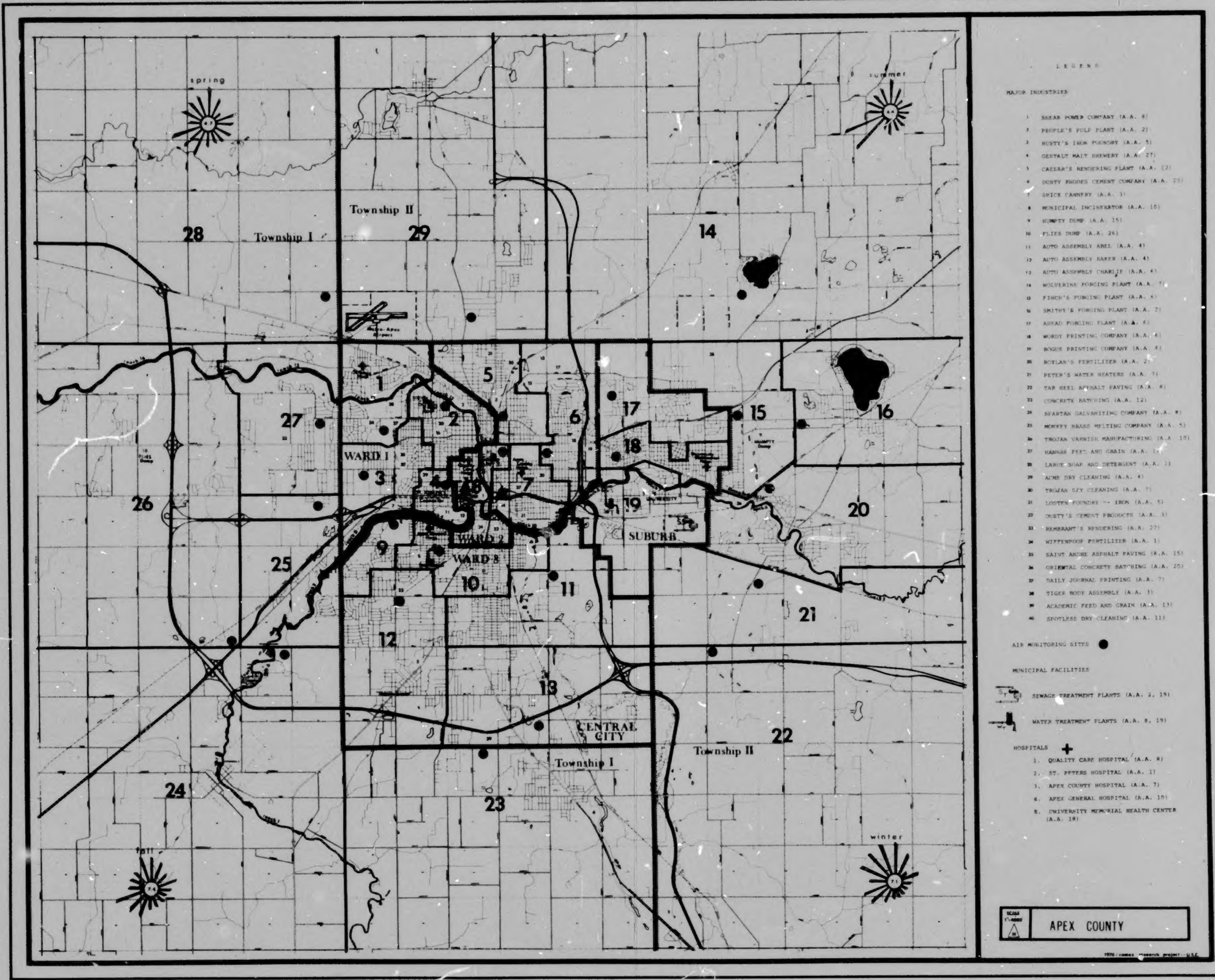
LEGEND
MAJOR INDUSTRIES
1 SHEAR POWER COMPANY (A.A. 8)
2 PEOPLE'S PULP PLANT (A.A. 2)
3 RUSTY'S IRON FOUNDRY (A.A. 5)
4 GESTALT MALT BREWERY (A.A. 27)
5 CAESAR'S RENDERING PLANT (A.A. 12)
6 DUSTY RHODES CEMENT COMPANY (A.A. 23)
7 SHICK CANNERY (A.A. 3)
8 MUNICIPAL INCINERATOR (A.A. 10)
9 HUMPTY DUMP (A.A. 15)
10 FLIES DUMP (A.A. 26)
11 AUTO ASSEMBLY ABEL (A.A. 4)
12 AUTO ASSEMBLY BAKER (A.A. 4)
13 AUTO ASSEMBLY CHARLIE (A.A. 6)
14 WOLVERINE FORGING PLANT (A.A. 7)
15 FINCH'S FORGING PLANT (A.A. 6)
16 SMITHY'S FORGING PLANT (A.A. 2)
17 AHEAD FORGING PLANT (A.A. 6)
18 WORDY PRINTING COMPANY (A.A. 6)
19 BOGUS PRINTING COMPANY (A.A. 6)
20 BOYLAN'S FERTILIZER (A.A. 2)
21 PETER'S WATER HEATERS (A.A. 7)
22 TAR HEEL ASPHALT PAVING (A.A. 8)
23 CONCRETE BATCHING (A.A. 12)
24 SPARTAN GALVANIZING COMPANY (A.A. 8)
25 MONKEY BRASS MELTING COMPANY (A.A. 5)
26 TROJAN VARNISH MANUFACTURING (A.A. 10)
27 HANNAH FEED AND GRAIN (A.A. 14)
28 LARUE SOAP AND DETERGENT (A.A. 1)
29 ACME DRY CLEANING (A.A. 4)
30 TROJAN DRY CLEANING (A.A. 7)
31 LOSTEN FOUNDRY -- IRON (A.A. 5)
32 DUSTY'S CEMENT PRODUCTS (A.A. 3)
33 REMBRANT'S RENDERING (A.A. 27)
34 WIFFENPOOF FERTILIZER (A.A. 1)
35 SAINT ANDRE ASPHALT PAVING (A.A. 15)
36 ORIENTAL CONCRETE BATCHING (A.A. 20)
37 DAILY JOURNAL PRINTING (A.A. 7)
38 TIGER BODY ASSEMBLY (A.A. 3)
39 ACADEMIC FEED AND GRAIN (A.A. 13)
40 SPOTLESS DRY CLEANING (A.A. 11)
AIR MONITORING SITES ●
MUNICIPAL FACILITIES
ST SEWAGE TREATMENT PLANTS (A.A. 2, 19)
WT WATER TREATMENT PLANTS (A.A. 8, 19)
HOSPITALS +
1. QUALITY CARE HOSPITAL (A.A. 8)
2. ST. PETERS HOSPITAL (A.A. 1)
3. APEX COUNTY HOSPITAL (A.A. 7)
4. APEX GENERAL HOSPITAL (A.A. 10)
5. UNIVERSITY MEMORIAL HEALTH CENTER (A.A. 18)
SCALE 1"=4000'
APEX COUNTY
1974 / comex research project -- U.S.C.
spring
summer
fall
winter
Township I
Township II
Township I
Township II
WARD 1
WARD 2
WARD 3
SUBURB
CENTRAL CITY
1
2
3
4
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BEST COPY AVAILABLE

CHAPTER 2

Glossary and Reference Terms

Chapter 2

GLOSSARY AND REFERENCE TERMS

ABATEMENT

Abatement is the reduction of pollutant emissions from a source or sources.

AEROBIC

A process taking place in the presence of oxygen; or a state of liquid containing free dissolved oxygen.

AIR POLLUTION

Air pollution is the presence in the outdoor air of substances which, when present in a sufficient quantity or over a period of time, can cause an undesirable effect upon man, property, or the environment.

AIR POLLUTION REGULATIONS

Air pollution regulations are legal constraints on pollutant emissions, production processes, or control systems. State regulations and County regulations are enforceable by legal sanctions, while recommendations are not.

AIR QUALITY (See NATIONAL AMBIENT AIR QUALITY STANDARDS)

Air quality refers to the pollution concentration characteristics of the atmosphere or ambient air in a given area. It is usually stated in terms of the levels of concentration of specific pollutants, in micrograms of pollutant per cubic meter of air (Mgm/m3) (See CONCENTRATION).

Air Quality Goals are expressions of desirable maximum pollutant concentrations to be achieved through a pollution control program.

Air Quality Criteria - The basic medical and technical information which forms the rationalization from which Air Quality Standards are set. This information is published for each major pollutant by EPA in Air Quality Criteria Documents.

Air Quality Standards are quantitatively-specified maximum levels of pollutant concentrations or dosages, as more precise statements of air quality goals.

AIR QUALITY CONTROL REGION

One of the approximately 250 geographic areas covering the United States which form the basic units for air pollution control activities. These areas were designated by EPA (with the states) and are based on considerations of climate, meteorology, topography, urbanization and other factors affecting air quality.

ALERT STAGES

Alert Stages refer to critical levels of concentration or dosage signaling potential disastrous pollution effects and requiring emergency abatement and control measures.

ANAEROBIC

A process taking place in the absence of oxygen; or a state of liquid containing no free dissolved oxygen.

ANALYSIS AREA (A.A.)

Analysis areas are used as the primary areal reference units for the data and issues throughout the game. The County is divided into a number of analysis areas, each of which is the approximate size of several census tracts. The analysis areas included in the five jurisdictions are as follows:

Jurisdiction 1-- Central City: Ward 1 = AA 1 through AA 4
Ward 2 = AA 5 through AA 8
Ward 3 = AA 9 through AA 13

Jurisdiction 2-- Suburb: AA 17 through AA 19

Jurisdiction 3-- Township 1: AA 23 through AA 28

Jurisdiction 4-- Township 2: AA's 14-16, 20-22, 29

Jurisdiction 5-- County: AA's 1-29

See APEX Analysis Area Map

ANNUAL WAGE

This is the annual cost to the Industrialist of one worker and is an average of the various rates of pay applicable to the different types of workers in the firm. The applicable average wage rate for each firm is reported in the Industrialist's printout each cycle under cost factors. This wage rate may be subject to negotiations with the labor representative and this new negotiated wage rate will supercede the rate found under cost factors on his printout.

ASSESSED VALUE

Assessed value is the value assigned to real estate property for purposes of assessing taxes owed to each of the jurisdiction County and school districts. Governments are required by law to maintain an assessed value of 50% of market value for propert in their jurisdiction, although this requirement is often not met. (E.g. if a residential property is valued on the market at $20,000, its assessed value is $10,000.) (See STATE EQUALIZED VALUE.)

BACKGROUND LEVEL

The amount of pollutants due to natural sources such as marsh, gas, pollen, conifer hydrocarbons and dust.

BOARD OF DIRECTORS

Each Industrialist acts as a Plant Manager and is responsible to the Board of Directors of his plant for his decisions and actions. The Board has the ultimate decision-making power in plant affairs and may approve, amend or reject the manager's fiscal policy proposal. The Board also sets the amount of dividends to be paid to the stockholders.

BONDING

Bonding is the process of incurring public debt to finance some capital improvement project. It is a device used to extend the incidence of costs over a long period of time, rather than have costs met out of current revenues while the project is under construction. Politicians may issue two kinds of bonds general obligation bonds and revenue bonds. These differ in three respects: (1) the need for voter concurrence, (2) how they are paid off, and (3) the kinds of projects for which they are appropriate. Before Politicians may float general obligati bonds to finance projects, voters must approve this action in a referendum. There is a State-imposed limit on the indebtednes that a jurisdiction may incur through general obligation bonds. The amount of additional bonded indebtedness that can be sought is indicated in the Politician's output as "$ Limit on Next G.O. Bond Sought". (See DEBT RETIREMENT for the process of financin general obligation bonds.)

Revenue bonds are not submitted to a referendum and are appropriate only for particular projects. (Projects for which they may be used are noted in the Project List.) They are paid off thro fees collected for the service provided by the facility, rather than by taxes.

CAPITAL PLANT INDEX (C.P.I.)

The capital plant index is a ratio of the present dollar value of public capital facilities (sewers, water lines, streets, parks and miscellaneous public holdings) to population equivalents. This number reflects the load imposed on facilities by residents, employees and clients, and this is considered an indication of the relative level of adequacy of these facilites. Present dollar value is calculated each cycle on the basis of depreciated value of existing facilities plus new facilites. (Facilities depreciate at about 5% of original value per year.) (See POPULATION EQUIVALENT.)

CASH CARRYOVER

This is the cash reserve which an Industrialist or Developer carries over to the next cycle after making all his expenditure including those for capital plant. It represents uncommited funds, which the player is free to use in the next cycle.

CASH TRANSFER

A cash transfer is used for loans or gifts of cash between players when the reason for the exchange is unspecified. Revenues made, or expenditures incurred, through an exchange of cash between either the Government, Industrialist, or Developer, are recorded in the budget section of their printout. When applicable, cash transfers are also used to cover the cost of television time and newspaper articles.

CLEAN AIR ACT AMENDMENTS OF 1970

(See LEGAL REFERENCE MANUAL.)

COLLECTION/DISPOSAL STUDY

Studies of municipal house-to-house refuse collection using combinations of different truck types, crew sizes, container locations, transfer stations and disposal sites to determine the capital and operating costs of alternative systems.

COLLOIDAL PARTICLES

Very fine particles of material in fluid suspension; particles will not settle out and can pass through a semipermeable membra

COMBUSTION

Combustion is the process of burning.

CONCENTRATION

Concentration is the ratio of pollutants to effluent gases or ambient air, measured in micrograms per cubic meter (MG/cubic meter) as a weight to volume ratio. Data on mean concentration per quarter, concentration on worst day, and number of days above a specified concentration can be obtained by the APCO, through the installation and operation of monitoring stations.

CONTAMINANT

(See POLLUTANT)

CONTROL EFFICIENCY

Control efficiency refers to the ratio of the amount of a pollutant removed from effluent gases by a control device to the total amount of pollutant without control.

CONTROL STRATEGY

A comprehensive plan designed to control or reduce the level of a pollutant or pollutants in the environment.

CONTROL SYSTEM

Control system refers to equipment and/or procedures intended to reduce the amount of a pollutant, or pollutants, in effluent gases. Each gamed industrial firm has a limited set of control system options for each production process and combustion process.

DEBT RETIREMENT (Debt Service)

Debt retirement, or debt service, is a term used to describe the process of paying off long-term general obligation bonds sold by public agencies. Debt retirement is a budget category of the Politician which includes expenditures for both principal and interest on general obligation bonds. Financing of these expenditures may be with either normal millage or debt retirement millage.

DEMOLITION COSTS (Clearance Costs)

A demolition cost of 5% of the assessed value of developed PROPERTY must be paid when developed land is rezoned.

DENSITY

In residential areas, density is the term used to express the number of dwelling units per acre of land. In APEX County a different density is associated with each of the five residential development types, with the lowest density found in land use category R-1 and the highest in category M-2.

The table on the following page expresses housing density in housing units per acre, and in acres per housing unit.

DEPRECIATION ALLOWANCE

Each cycle, the total value of industrial capital facilities, (building and equipment) depreciates at 8%. A tax credit of 5% of the capital value of these facilities is allowed the Industrialist to compensate for this depreciation. The amount is deducted before Federal and State income taxes are paid. The Industrialist may claim any part of his maximum allowance; any portion of the allowance not taken will accumulate. The maximum depreciation allowance is listed under cost factors in the Industrialist's printout.

DEVELOPMENT TYPES AND COSTS

A. Residential

In APEX County there are various levels of cost and density associated with different qualities and sizes of housing which may be built by Developers. These costs are for structures, exclusive of land and site improvements.

Single Family
Three different development-cost levels are applicable to APEX County single-family housing units, ranging from the highest construction cost of $40,000 (designated as R-1) to the lowest cost housing, built at $15,000 per unit (designated as R-3). Any one of these types may be built on land which, when vacant, is zoned R.

Multiple Family
Units of two different cost levels, M-1 and M-2 are available for construction of multi-family housing in APEX County. The highest cost per unit, for M-1, is $30,000 and the lowest, for M-2, is $12,000. Either of these types may be constructed on vacant land zoned M.

Residential Development Costs Per Unit

R-1	R-2	R-3	M-1	M-2
$40,000	$22,500	$15,000	$30,000	$12,000

HOUSING DENSITY

AA	R-1		R-2		R-3		M-1		M-2	
	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit
1	1.4	.714	3.5	.286	5.6	.179	11.2	.089	21.0	.048
2	2.4	.410	6.0	.167	9.6	.104	19.2	.052	36.0	.028
3	2.0	.500	5.0	.200	8.0	.125	16.0	.063	30.0	.033
4	2.8	.357	7.0	.143	11.2	.089	22.4	.045	42.0	.024
5	2.1	.476	5.25	.190	8.4	.119	16.8	.060	31.5	.032
6	1.6	.625	4.0	.250	6.4	.156	12.8	.078	24.0	.042
7	2.5	.400	6.25	.160	10.0	.100	20.0	.050	37.5	.027
8	3.0	.333	7.5	.133	12.0	.083	24.0	.042	45.0	.022
9	1.2	.833	3.0	.333	4.8	.208	9.6	.104	18.0	.056
10	2.5	.400	6.25	.160	10.0	.100	20.0	.050	37.5	.027
11	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
12	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
13	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
14	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133
15	.6	1.667	1.5	.667	2.4	.417	4.8	.208	9.0	.111
16	.8	1.250	2.0	.500	3.2	.313	6.4	.156	12.0	.083
17	1.2	.833	3.0	.333	4.8	.208	9.6	.104	18.0	.056
18	2.3	.435	5.75	.174	9.2	.109	18.4	.054	34.5	.029
19	3.0	.333	7.5	.133	12.0	.083	24.0	.042	45.0	.022
20	.8	1.250	2.0	.500	3.2	.313	6.4	.156	12.0	.083
21	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133
22	.4	2.500	1.0	1.000	1.6	.625	3.2	.313	6.0	.167
23	.7	1.429	1.75	.571	2.8	.357	5.6	.179	10.5	.095
24	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
25	.4	2.500	1.0	1.000	1.6	.625	3.2	.313	6.0	.167
26	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
27	.6	1.667	1.5	.667	2.4	.417	4.8	.208	9.0	.111
28	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
29	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133

B. Commercial

Two types of commercial land use are allowable in APEX County. These relate to local neighborhood shopping facilities and to regionally-oriented commercial and service facilities. Both may be built only on zoning category "Commercial" land. Each is developed on a cost-per-acre basis, as follows:

Commercial Development Costs by Type

CL	CR
$100,000	$125,000

C. Industrial

Endogenous industrial development permitted Developers in APEX County is on a per-acre basis, the cost being $100,000 per acre. Zoning category I land may be developed into this land use.

(See ZONING CATEGORY.)

DOSAGE

The accumulated exposure of a person, plant, materials, etc., to a particular concentration of pollutant for a specified period of time.

DUMP

A site where uncontrolled disposal of solid waste occurs.

EFFLUENT

An effluent is a gaseous or liquid discharge or emission.

EFFLUENT SAMPLES

An effluent sample is an industrial outflow water sample and analysis which provides data on seven water pollutant parameters. A sample may be ordered by the Water Quality Manager and is taken at the source specified by the WQM.

ELITE OPINION POLL (E.O.P.)

The Elite Opinion Poll calls for a vote of all game players on certain major policy issues in the community. These issues appear as headlines in the METRO-APEX NEWS, which ask for either a deciding or advisory vote. The results of the Poll affect public officials' chances of reelection, as well as the probability of passage of general referenda, specific bond issues and special millage requests.

EMERGENCY EPISODE

An air pollution incident in which high concentration of pollutant(s) occur in the ambient air contributing to a significant increase in illness or death.

EMISSIONS

Emissions are pollutants in effluent or exhaust gases which are released into the air.

EMISSION FACTORS

Emission factors are estimates which can be used to approximate the rate of emissions of specific pollutants from generalized sources.

EMISSION INVENTORY

A compilation of the rate of pollution emissions in a given area by source type.

EMISSION MEASUREMENT

Air pollution emissions are measured in pounds per hour for particulates, sulfur dioxide (SO2), carbon monoxide (CO), nitrogen oxides (NOx), and hydrocarbons (HC); in Ringelmann number for smoke; and in Stinkelmann number for odor. The emissions measured are of specific pollutants from specific sources.

EMISSION RATE

Emission rate refers to the amount of pollutant emitted per unit of time or throughput. Maximum allowable emissions will be specified in pounds per hour (or pounds per 1000 pounds of process rate) if they refer to emission rates.

EMISSIONS SOURCE

An emission source is the origin of some specific air pollutants. In the game there are several gamed point sources, about thirty non-gamed point sources, plus motor vehicles and space heating as line and area sources, respectively.

ENVIRONMENTAL IMPACT STATEMENT

The results of a study which identifies and evaluates the adverse or beneficial environmental effects of pursuing a proposed action, pursuing an alternative action or not pursuing the proposed action.

EXOFIRM (EXOGENOUS FIRM)

An Exofirm is an industry or bureaucratic firm that depends primarily upon markets outside the local area for its growth and vitality. These firms are usually classified as Exofirms on the basis of their being net importers of dollars and net exporters of products or services to these outside markets. Jobs created by Exofirm growth spur additional growth of households and jobs oriented to the local market. (Exofirms are also often referred to as basic firms).
In APEX County, Exofirms locate in industrial and office zoning categories. Periodically, the newspaper will note the opportunity for Developers or Industrialists to invest, in a speculative way, in the entry of new Exofirms into the metropolitan area, with a variable probability of success attached to such investments. Occasionally, these Exofirms require rezoning of land and/or installation of special capital improvements. Requirements for such special public action and requests for private investment will be noted in the newspaper announcement of the firm's interest in locating in the area.

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972

(See LEGAL REFERENCE MANUAL)

FUEL RATE

The amount of fuel consumed by each industry per unit of time is specified in tons/hours for coal, in barrels (bbl)/hour for oil, in thousand cubic feed (MCF)/hour for natural gas, and in megawatts (MW) for electricity.

FUEL TYPE

The fuel types for industry include: low-grade coal (Lo-Coal), high-grade coal (Hi-Coal), low grade oil (Lo-Oil), high-grade oil (Hi-Oil), natural gas, and electricity. The fuel option for each plant is listed in the Industrialist's printout. The fuel grade refers inversely to the air pollution potential of the burining fuel, i.e., Lo-Grade has higher pollution potential, and Hi-Grade fuels have low pollution potential.

GARBAGE

The food waste portion of solid waste.

HAZARDOUS AIR POLLUTANTS

Air pollutants not covered by the Air Quality Standards but which, in EPA's judgement, "may cause, or contribute to, an increase in mortality or --- serious illness." These pollutants generally are toxic substances such as mercury, cadmium, asbestos and beryllium.

HAZARDOUS WASTE

(See "SOLID WASTE TYPE")

HOUSEHOLD/COMMERCIAL REFUSE

(See "SOLID WASTE TYPE")

HOUSEHOLD TYPES

The five household types used in APEX County are characterizations of families belonging to fairly homogeneous socio-economic groups. These characterizations reflect life style, political involvement and voting habits, general consumption behavior and preference for public goods. There is substantial overlap of income levels for all status groupings; hence income, alone, is a weak indicator for characterizing households.

Household Type 1 -- is upper class and upper-middle class combined. Occupations of the heads of households are: professionals, technical workers, managers, officials, and proprietors. One-half of the family income levels are in excess of $15,000 and the other half are in the $10,000-$15,000 range. Value of housing is in excess of $20,000, and if they rent, rentals are over $150 per month. This is the group which is most concentrated in residential locations. Education of the head of the household is at least college graduate, often with post-graduate study. Interest group membership for this household type is found in the Business Community and Effective Government Groups.

Household Type II -- is the typical middle-class household in which the head of households occupation is clerical, sales, or kindred types. Income of the family is primarily in the $7,000-$10,000 range. Education of the head of the household is some college or at least high school graduation.

Housing value is primarily in the $15,000-$25,000 range, and gross rentals would usually be from $100 to $149 per month, though they may be somewhat lower. Interest group affiliations for this type are with the Effective Government Groups on the one hand, and with the Right-wing Conservatives on the other.

Household Type III -- the most numerous and widely-distributed of the five types is characterized by a mixed membership of very low income white collar workers, skilled craftsmen, and foremen, though the latter two predominate. In the outlying areas, farmers fall into this category. Family income is primarily in the $5,000-$9,000 range. The head of the household's education is typically high school graduation. Housing value is usually in the $12,000-$20,000 range and rentals are from $80-$125 per month. Members of this group are apt to belong to the Labor Vote and/or the Right-wing Conservative interest groups.

Household Type IV -- is composed of semi-skilled workers, industry operatives and non-household service workers, such as waiters, barbers and parking-lot attendants. Family income is in the lower portion of the $4,000-$7,000 range. Housing values range from $10,000 to $14,000 with gross rentals being $70 to $90 per month. Education of the head of the household is usually 9 to 11 years. Interest group membership for this household type is found in the Labor Vote and among the Civil Rights Groups.

Household Type V -- is the lowest stratum of society, and heads of households are laborers or household service workers. The vast majority of the area's unemployment are of this type and roughly half of all members are elderly and retired. Family income is less than $5,000 annually and the value of housing is less than $10,000, with rentals primarily $50-$75 per month. Heads of households have usually not been educated beyond the eigth grade. Membership in interest groups is found in the Labor Vote and Civil Rights Groups.

Political involvement of the five household types declines from Type I (the highest) to Type V, the latter being generally apathetic. Likewise, concern with government operation and provision of public services is highest in Type I households and declines steadily through Type V families.

The five household types will tend to demand housing of the five residential development types according to the following percentages:

Household Type I -- 50% will choose R-1; 30% R-2 and 20% M-1

Household Type II -- 20% will choose housing in each of the five development types

Household Type III -- 10% prefer R-1; 30% prefer R-2; 20% choose R-3; 25% take M-1, and 15% M-2

Household Type IV -- 20% will choose R-2; 40% R-3; 10% M-1, and 30% M-2

Household Type V -- 40% will be in R-3; 60% in M-2

IMPLEMENTATION PLAN

Under the 1970 Clean Air Act, each state must prepare and have approved by EPA an Implementation Plan which details the methods, strategies and timetable which the state and its jurisdictions will employ to meet and maintain the Air Quality Standards within the control region(s) within its jurisdiction.

IMPROVEMENT COSTS

Improvement costs are fees to prepare raw land for development, including subdivision costs, sewer and water connecttions, drainage and engineering. Developers are required to pay improvement costs on all land on which they build structures. For residential property, improvement costs are on a per unit basis as follows:

R-1	R-2	R-3	M-1	M-2
$1,000	$800	$700	$600	$400

For commercial and local industrial land uses, improvement costs are on a per acre basis; for each the fee is $5,000 per acre.

These fees are automatically applied to all land on which the Developer builds.

INTEREST GROUPS

In APEX County there are 5 major political interest groups that take stands on public policy issues and have a significant impact upon voting behavior. The more extreme the position assumed by one of these interest groups (as indicated on a scale of +4 to -4), the greater will be the voter turnout surrounding any particular referenda or election. Each of these interest groups derive their constituency from among two or more of the "Household Types" (See HOUSEHOLD TYPES)

1. CIVIL RIGHTS GROUPS: The orientation of these groups is primarily towards issues such as fair employment, neighborhood improvement, and problems that affect minorities. Their leadership is drawn from the elite liberals or the ghetto activists, their membership from the lower social strata. Their mode of operation is typically public protest and demonstrations centered around a very specific policy issue or community problem, and their influence on the system as a whole is moderate.

2. EFFECTIVE GOVERNMENT GROUPS: Are overwhelmingly middle class, composed primarily of professional people, a large percentage of them women. These groups are interested in a wide range of issues, on which they exert moderate influence. their orientation is towards governmental efficiency and towards community growth and image.

3. BUSINESS COMMUNITY: Draws from the whole range of commercial and mercantile interests, as well as some from the professional areas such as law, engineering and medicine. The business community exerts the highest degree of power of all politically oriented interest groups; their interest is directed primarily at community image, growth, and "BOOSTERISM".

4. LABOR VOTE: Are more conservative locally than nationally and exhibit some divergency between craft unions and industrial unions, the former being more conservative. The labor vote exert moderate influence on a range of issues somewhat less broad than those of interest to the "Effective Government Groups". The conservatism of the labor vote is especially apparent in the opposition of some of its constituency to public spending for social welfare.

5. RIGHT-WING CONSERVATIVES: Draws its membership primarily from people who resist change and advocate conserving the "traditions of Americanism--God and Country." They are generally against social change, increases in government influence in local affairs and public spending on social programs. Since these groups do not advocate change, they usually only become actively involved in public issues as a reaction to public programs proposed by other groups.

INTEREST RATE

The cost of borrowing money will vary for the Industrialists and Developers according to both their credit rating and the length of the loan, i.e., how many years will be taken to repay it. The maximum number of years on any loan by an Industrialist or Developer is 20 years. Applicable interest rates as follows:

Years to Repay	Credit Rating		
	A-1	A-2	A-3
1-2	4%	6%	8%
3-5	6%	8%	12%
6-10	8%	12%	16%
11-20	12%	16%	20%

The cost of borrowing money for governmental agencies, the interest rate on bonds, will vary according to the credit rating of the jurisdiction, and will differ between general obligation and revenue bonds. Since revenue bonds are not backed by governmental taxing power they are riskier and therefore carry higher interest rates than general obligation bonds. As a jurisdiction's credit rating falls from A-1 to A-3, the interest rate on general obligation bonds will increase from 4.5% to 6%.

INVERSION

A layer of air trapped near the ground by a layer of warmer air above it.

ISSUE

Issue is used to refer to a problem situation presented to players in the METRO-APEX NEWS. Following each issue are two to four alternatives one of which must be selected by the player.

(See ELITE OPINION POLL)

JURISDICTION

Jurisdiction refers to one of the political units in APEX County. Abbreviations used in the game are:

(Jurisdiction 1) CC - Central City
(Jurisdiction 2) SUB - Suburb
(Jurisdiction 3) TW 1 - Township 1
(Jurisdiction 4) TW 2 - Township 2
(Jurisdiction 5) Co - County

(See ANALYSIS AREA.)

LAND USE

Land use is a term used to refer to the spatial distribution of City and rural functions--its residential communities or living areas, its industrial, commercial and retail business districts or major work areas and its agricultural, institutional and leisure time functions.

(See DEVELOPMENT TYPE and ZONING CATEGORY.)

LEACHATE

Water moving vertically through the soil of a landfill that may become contaiminated from the waste material in the fill.

MAXIMUM PRODUCTION CAPACITY

This is the maximum number of units which can be produced by a gamed industry in a cycle, with the plant and equipment in existence during that cycle. Maximum capacity may be increased by making capital expenditures for building and equipment. New productive capacity becomes available only in the cycle following that in which money is budgeted for plant expansion.

MEAN PROBABLE NUMBER PER 100 ml (MPN/100 ml)

A measure of the amount of coliform organisms per unit volume. By using quantities of sample varying in geometric series i.e., 0.01, 0.1, 1.0 milliliters, and by applying the usual test for coliform organisms, it is possible to determine a statistical estimate or "most probable number" of coliform organisms per 100 ml of water.

MICROGRAMS PER CUBIC METER

The weight of a substance in 1/1,000,000 of a gram contained in one cubic meter of volume.

MILLAGE

Millage is the tax rate, in mills, which is applied to State equalized property value to generate property tax revenue. One mill is equal to a $1 charge on each $1000 of value, or one tenth of one percent of the State equalized value. There are three types of millage:

A. Normal Operating Millage is determined by local Politicians and is applied to standard operating costs of government by State and local law -- the local limit can never be higher than the limit set by the State.

B. Special Millage, which is not subject to State and local limits, can be used for financing special programs. It must be voted and passed on in a referendum.

C. Debt Retirement Millage is not subject to the State and local limits but it can be used for retiring general obligation bonds. This millage requires a favorable vote in a referendum.

Total millage is the sum of operating millage, any special millages and the debt retirement millages which may be in effect during the year.

MILLIGRAMS PER LITER (mg/l)

Weight per unit volume. For water effluents, milligrams per liter is used to express the concentration in terms of the weight in milligrams of a dissolved or suspended pollutant in one liter of water.

MONITORING STATION

A monitoring station is a facility that houses air quality monitoring equipment for measurement of ambient air quality. One air quality monitoring station may be installed and operated in any analysis area. The pollutants measured at each monitoring station are:

Particulates, SO2, CO, NOx, and Hydrocarbons

Each pollutant is measured by a different type of monitoring equipment.

(See AIR QUALITY)

NATIONAL AMBIENT AIR QUALITY STANDARDS

EPA has set Primary and Secondary Air Quality Standards which are the maximum concentration of air pollutants allowable by federal law. Primary Standards are based on protection of the public health and are to be achieved as a first priority. Secondary Standards are based on the public welfare and will be achieved as a second priority.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

(See LEGAL REFERENCE MANUAL)

OFF GASSES

Gasses arising from landfills or other solid waste conversion (such as thermal) operations and leaving the site of generation.

PLANNED UNIT DEVELOPMENT

A planned unit development is an allocation of density to a development site such that the overall density meets the zoning requirements, but within the site certain areas may be of a higher concentration than those other developments around this site. This allows the Developer more flexibility in designing planned neighborhoods.

(See DENSITY)

PLANT INSPECTION

A plant inspection is an "on-site" examination of production and pollution control equipment, processes and procedures. Plant inspections ordered by the APCO will provide him with information on the production processes; production capacity; fuel and process rates; control systems; smoke code (Ringelmann number); and odor code (Stinkelmann number) for each process of a specific gamed or non-gamed emission source.

PLANT MANAGER

The player in the role of Industrialist is acting as a Plant Manager.

(See BOARD OF DIRECTORS.)

POLLUTANTS

Air Pollution:

(1) Particulates: particulate matter is any material (except uncombined water) which exists in a finely divided form as a liquid or solid at standard conditions.

(2) Sulfur Dioxide (SO_2) is a pungent colorless gas which is commonly emitted from the combustion of sulfur containing compounds, especially fuels such as coal and fuel oil. Sulfur dioxide can also be emitted from chemical process plants, metal process plants and trash burning incinerators.

(3) Carbon Monoxide (CO) is a colorless, odorless, very toxic gaseous product of the incomplete combustion of common fuels. It can also be generated by metabolic processes and the partial oxidation of carbon-containing compounds such as limestone. Carbon monoxide adversely affects human respiration by interferring with the body's ability to assimilate oxygen.

(4) Oxides of Nitrogen (NOx) are formed when oxygen and nitrogen are heated to a high temperature. Sufficiently high temperatures to produce significant amounts of NOx are normally only reached in modern efficient combustion processes such as electric power plants and automobile engines. Oxides of nitrogen in combination with hydrocarbons and sunlight are major constituents of photochemical smog.

(5) Hydrocarbons (HC) are compounds containing combinations of hydrogen and carbon. Gaseous hydrocarbon air pollutants are most commonly emitted from the incomplete combusion of fuels such as gasoline, coal, oil and gas from the production, handling and evaporation of gasoline, paint thinners, solvents, etc. Hydrocarbons along with oxides of nitrogen and sunlight are important in the generation of photochemical smog.

Water Pollution:

(1) Biological Oxygen Demand - B.O.D. is the amount of oxygen needed by any polluted water or sewage to allow micro-organizms to consume the suspended and dissolved biodegradable organic material found in the liquid under aerobic conditions.

(2) Coliform Bacteria - Micro-organisms found in sewage serving as the indicator of bacterial contamination in water quality.

(3) Dissolved Oxygen (D.O.) is the amount of oxygen found and available for biochemical activity with a given volume of water (mg./l.). The saturation point is dependent upon temperature, chemical characteristics of the water, and barometric pressure.

(4) Nutrients - Nutrients are phospates, nitrates, nitrogen and phosphorus released as waste from certain industries or produced from agricultural and urban runoff.

(5) Thermal Pollution - The increase in temperature of surface waters as a result of the use of these

waters for cooling purposes by industry or public facilities. The heat accelerates biological processes in the stream, resulting in reduction of oxygen content of the water.

(6) Total Dissolved Solids (T.D.S.) - The amount of solids, dissolved in a given volume of water (mg./l).

POPULATION EQUIVALENT

The population equivalent is a means of converting (a) residents, and (b) employees and clients of industries and commercial facilities into a standard measure of the demand placed on such public capital facilities as sewers, streets, and water supply. The population equivalent of an area (analysis area or jurisdiction) is computed as follows:

P.E.= [Total households]+[.8 x all employees of commerce and industry]

For use of population equivalents in APEX County, see CAPITAL PLANT INDEX.

PROCESS RATE

Process rate refers to the amount of materials processed by an Industrialist per unit time. The measure is specified in tons, pounds, barrels, per minute, per hour, etc.

PRODUCTION LEVEL

This is probably the key item determined by an Industrialist each cycle. It is the number of units of a product his plant will produce in that cycle. The Industrialist is free to set his production at any level he chooses, as long as the figure he sets does not exceed his maximum production capacity.

PRODUCTION PROCESS

A production process is a definable part of the overall production system of a given firm. Each gamed industrial firm may have up to five production processes, while each non-gamed industrial firm is assumed to have only one process.

PROMPT SCRAP

Wastes that are recycled for direct reuse without entering the solid waste stream.

QUASI-PUBLIC LAND

This is land owned by tax-exempt organizations such as churches and fraternal organizations. Such land includes church buildings and schools, cemeteries and such miscellaneous buildings as Elks lodges, etc.

REACH

A reach is a generally homogeneous segment of a river or stream. Often in water quality management typical measurements of water quality from any point in the reach are used as representative of the entire reach.

REFERENDUM

A referendum is a vote of the (simulated) population of a jurisdiction on some issue presented to the people by the Politician. Most usually referenda are called to approve (or reject) a general obligation bond issue or a request for special millage, although they may be called to approve some legislative matter, such as open housing.

REFUSE

A term applied broadly to mixed solid waste including food waste, trash, street sweepings, and non-toxic solid industrial wastes.

REZONING APPLICATION FEE

The rezoning application fee is a charge of $100, which is assessed for each rezoning request submitted by a Developer or Industrialist. It is included in that player's financial statement for the next cycle.

RINGELMANN NUMBER

The Ringelmann Number is a scale for measuring the blackness of smoke fumes and is equivalent to the opacity. Ringelmann Numbers and opacities are used for specifying allowable smoke emissions (Ringelmann for black and opacity for other colors). #0 = zero opacity #1 = 20%, #2 = 40%, #3 = 60%, #4 = 80%, #5 = 100%. In APEX County, all smoke readings are reported as Ringelmann Numbers.

SALVAGE

The recovery for reuse of any valuable component from the solid waste stream.

SANITARY LANDFILL

An operation where solid waste is deposited in the ground in a controlled manner. The waste is compacted when delivered and covered daily. APEX County can have three classes of sanitary land fills. (See below.)

SANITARY LANDFILL--Class I

A site where disposal of toxic or hazardous industrial waste (solid waste type 1) is permitted due to the geology and soil characteristics. Solid waste type 2 and 3 may be deposited in this class site.

SANITARY LANDFILL--Class II

A site where only non-toxic or non-hazardous waste may be deposited. These sites receive primarily mixed municipal refuse (solid waste type 2). Solid waste type 3 may also be deposited in this class site.

SANITARY LANDFILL--Class III

A site where only solid fill (solid waste type 3) may be deposited.

SEWAGE TREATMENT LEVELS

Primary Treatment - A series of mechanical treatment processes including screening and sedimentation, which removes most of the floations and suspended solids found in sewage, but which have a limited effect on colloidal and dissolved material.

Secondary Treatment - A series of biochemical, chemical, and/or mechanical processes which remove, oxidize or stabilize nonsetteable, colloidal, and dissolved organic matter following primary treatment.

Tertiary Treatment - Any sewage treatment process that has the capability to remove over ninty-nine percent of the pollutants in sewage if it follows secondary treatment.

SOIL PERMEABILITY

A measurement of the water porosity of soil; soil porosity measured in gallons per day of water which will be absorbed by one square foot of soil surface.

SOIL SURVEY

An engineering/geological survey of an analysis area which provides data on the water table level, soil type, and soil permeability. These parameters are important criteria to determine the suitability of an A.A. for Class I, II, or III sanitary land fills.

SOIL TYPE

Three predominent soil types are found in APEX County--clay, sand or gravel.

SOLID WASTE

Any waste that can be handled as a solid rather than a liquid.

SOLID WASTE DISPOSAL

The end point of solid waste handling; may include open dumps, sanitary land fills, incinerators, composting, hauling out of APEX County by contract, salvage and recycle, etc.

SOLID WASTE SOURCES

Solid wastes are generated from various sources as --

Household - Solid wastes from residences.

Commercial - Solid wastes derived from non-industrial commercial operation.

Industrial - Wastes produced as a result of manufacturing or related industrial operation.

Municipal - Mixed Household and Commercial waste that may contain some street cleaning wastes and industrial solid wastes.

Agricultural - Wastes derived from basic crop or animal operation including waste vegetables, minerals and animal manure.

SOLID WASTE TYPE

APEX County solid wastes are specified as one of three following types--

S.W. Type 1 - Hazardous Wastes; includes sewage sludge, pesticides, industrial chemicals, etc., (Only small quantities of high toxic wastes and radioactive wastes are generated in APEX County and these are not included in Type 1 wastes.)

S.W. Type 2 - Household/Commercial Refuse; includes trash, rubbish, garbage and decomposable organic refuse from commercial and household operations picked up by regular route collection.

S.W. Type 3 - Solid Fill; includes bulky non-water soluable, non-decomposable inert solids from municipal and industrial operations, demolition, etc. Examples are earth, rock, gravel, concrete, asphalt paving fragments, clay, glass, and rubber products.

Industrial wastes are distributed among the above three categories depending upon the characteristics of the particular waste.

SOURCE TYPES (AIR POLLUTION)

Point Source - A stationary source of pollution which has the potential of emitting a substantial amount of pollutant(s) such as a factory or power plant.

Line Source - A moving source of pollutants such as automobiles, buses, trains, and aircraft.

Area Sources - The sum of numerous widespread small stationary pollution sources as the space heaters in buildings.

Indirect or Complex Source - Stationary facilities or developments which indirectly generate substantial pollution by means of activity associated with them (such as vehicle traffic generated by shopping centers, sports complexes, airports, etc.)

STANDARDS OF PERFORMANCE

Direct limitations of pollutant emissions from certain types of high pollution sources (power plants, etc.) set by EPA and/or the states.

STATE EQUALIZED VALUE

State equalization is a process designed to even out differences in assessment practices among political jurisdictions. The state equalization factor applied to each jurisdiction's assessed value may thus be different. The state equalized value for a jurisdiction, reached by applying the factor to local assessed value, is the base on which millage is levied to generate property tax revenues.

STINKELMANN NUMBER

The Stinkelmann Number is a scale (developed in APEX County) for measuring odor emissions, and for specifying maximum allowable odor emissions. Numbers range from 0-5, covering least to worst odor levels, respectively.

TAX RATE

See MILLAGE

TRANSFER STATION

Site at which wastes are transferred from small compacter vehicles to larger long distance transport vehicles.

TRASH

The non-food, non-putrescible fraction of solid waste.

UNIT COSTS

The costs to the Industrialist of operating his plant are calculated, for each production component, except labor, on the basis of the amount and cost of each component required to produce one unit of the product. These unit costs apply to fuel, administrative overhead, inventory, and raw materials.

Fuel Cost applies to the fuel required to produce each Industrialist's product and will be different for each fuel type.

General Administrative Costs include all overhead expenditures, other than salaries, involved in production.

Inventory Carrying Costs must be paid to store product inventory from one cycle to the next. This cost excludes taxes on inventory.

Materials Costs include all raw materials required to produce the product, except fuel.

The unit costs for each of these components which are applicable for a particular Industrialist for the next year are included in that player's output.

UNIT SALES PRICE

This is the price, which an Industrialist sets each cycle, at which he will sell a unit of his product. Each Industrialist except the power plant has complete control over price; although the number of units he actually sells will be dependent on the relationship of his price to supply-demand conditions in the general market, and to the current average industry-wide price (reported for the last three years in the Industrialist's output).

WATER QUALITY SAMPLES

A water quality sample is a water sample and analysis providing data on seven water pollutant parameters. The water quality manager may order water samples and designate the location from which they are to be taken.

WATER TABLE LEVEL

The distance from the surface of the ground to the underlying ground water level.

ZONING CATEGORY

Zoning categories apply only to vacant land for APEX County. Each of the six zoning categories may be developed into one or more types of land use:

FROM	TO
Zoning Category	Developed Land use Type(s)
(1) R - Single-family residential	(1) R-1 (low density, high cost) (2) R-2 (med. density, med. cost) (3) R-3 (high density, low cost)
(2) M - Multiple-family residential	(4) M-1 (low density, high cost) (5) M-2 (med. density, low cost)
(3) C - Commercial	(6) CL (Commercial-Local) (7) CR (Commercial-Regional)
(4) I - Industrial	(8) IL (Local industry) (9) IX (Exogenous industry)
(5) O - Office	(10) O (Exogenous office)
(6) A - Agricultural	(11) A (Active farming)

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CHAPTER 3

Role Description

Chapter 3

INDUSTRIALIST'S ROLE DESCRIPTION

The Industrialist in APEX County participates in his own independent business sub-game. Along with the Developer, he represents the economic interests of a segment of the private sector of APEX County. Seven industries are included in the gamed component of METRO-APEX: forty more are simulated in the computer, and additional ones may enter from time to time. The roles of the gamed Industrialists are quite similar but each operates a distinct industry with unique characteristics. These include a power company, a pulp mill, a cement plant, a rendering plant, an iron foundry, a brewery and a food cannery.

The product of each of the gamed industries, except for the power plant, is marketed predominantly outside of APEX County. Thus, the success of each industry in generating revenue is tied to the regional and national economy. However, many of the factors influencing the cost patterns faced by the Industrialists are linked to the policies of APEX County; for example, those dealing with tax structure, capital plant infrastructure, local labor market and pollution control. Most firms seek to maximize profits; however, other motivations and concerns can and should affect the decision processes of the firms of APEX County.

Each Industrialist serves as Plant Manager for his firm. As Plant Manager the Industrialist receives computer printout at the start of each cycle recording the results of his earlier decisions and providing the basis for the next round of decisions.

One of the major decisions that the Industrialist must make is the setting of his production level. Of course, this level must fall within the constraints of his existing plant capacity. When the production level is set, the employment level is automatically determined because there is a fixed ratio between production level and number of employees for each industry. Also, when the production level is set, the various operating costs associated with production are determined for that cycle from fixed ratios. These include material costs, labor costs, fuel costs, general administration costs, utility costs and waste disposal costs.

Another major decision involves the setting of the sales price for his product. The computer printout will show both his sales prices and the average industry-wide prices for the past three years. Using this history of the supply characteristics of the industry as a guide, as well as some independent demand estimates, the Industrialist can set his new sales price and estimate the volume he will sell.

The Industrialist also has the option to expand his physical plant, including equipment, buildings and land. The size of the existing plant at the beginning of each cycle will set a maximum on production capacity during that cycle. No Industrialist will be able to sell more than he can produce at maximum capacity--plus what he carries over from the previous cycle in inventory. (An exception here is the Power Plant because it has no inventory.) To produce more than this limit, he may choose to expand his production capacity. This is accomplished by adding to his production equipment, which may also require increased building space and additional land. Such additions become useable or operational in the cycle following that in which the expenditures were made; therefore, there is a one-cycle lag between expenditures and increased capacity. The Industrialist should remember that depreciation will decrease his production capacity each cycle unless balanced by expenditures to counter the deterioration of existing equipment.

The Industrialist may find it necessary to borrow money to pay for his plant's expansion and production costs. There is an externally imposed limit on the Industrialist's borrowing power reflecting his credit rating and overall indebtedness. There is an internally imposed limit as well--his ability to meet payments including interest. The interest rate will be set according to the Industrialist's credit rating and the duration of the indebtedness period.

In weighing the success of his production and expansion decisions, the Industrialist will have to resolve trade-offs between the demands of maintaining short-run liquidity and maximizing short-run profits and long-run business expansion goals. For example, the Industrialist may petition the Board of Directors of his company (the Game Overall Director or role advisor) to increase or decrease dividend payments, thus altering the retained earnings needed to expand his operations.

In addition, a variety of activities over which he has little or no control will affect his financial success. The national economy will determine his actual sales, given the prices, and production level he sets. The economy also establishes wage and administrative salary rates, material costs, inventory carrying charges, base interest on loans, and Federal and State income taxes. The effects of the local economy will be felt most directly through building costs, property taxes, pollution control regulations, utility costs and waste disposal costs.

While the Industrialist will have a large part of his attention focused on normal industrial and business operations, he will also have to deal with many compelling issues of community-wide interest. Probably one of the most important issues that will involve the Industrialist is environmental pollution problems. In seeking to improve the quality of the environment, the Federal, State and County governments may be concerned with the air pollution emissions, water pollution effluents and solid waste disposal from the Industrialists own production processes. They may be proposing standards of environmental quality (maximum pollutant levels) and solid waste disposal methods which they consider necessary for maintenance of the public health and welfare. In order to achieve and maintain these levels of environmental quality they may propose rules and regulations specifying the maximum amount of air and water pollutants a source will be allowed to add to the environment. A schedule of penalties, charges and fines may be proposed for those sources exceeding these limits. When an Industrialists pollution output is above the legal limits he may be required to install air pollution control equipment, water effluent treatment systems or divert his water effluent to the municipal sewage treatment plant. The installation of industrial air pollution control equipment, water treatment systems, and solid waste processing equipment will require that the Industrialist bear the cost of initial investment and annual operations. (In some cases costs can be reduced through recovery of valuable waste products).

Dumping effluent water to one of the sewage treatment plants will require paying an initial municipal sewage system "hook up charge" plus a yearly charge for municipal treatment of his effluent. The installation of air pollution control equipment using water sprays or scrubbers may add to the Industrialists water pollution load. Likewise, the installation of water treatment systems or solid waste processing equipment may add to the Industrialists air pollution problems by creating odors. An Industrialist may be forced to lower his production and/or change the fuel he uses in order to comply with pollution or waste disposal regulations.

Obviously, the Industrialist will be concerned about the setting of legal standards of effluent quality and the methods adopted for waste disposal by the County Politicians and he may seek to influence their decisions. He may want to estimate for himself, using information in this manual, whether or not he is violating approved standards. Each Industrialist also has the option of buying information in the form of consultant surveys concerning both the emissions and effluents from his plant and the pollution control and treatment systems available to him. He must then consider the remedial options available to him and try to evaluate the costs and benefits of the alternatives. Finally, he may choose to argue, appeal, or take to court any alleged violation of pollution regulations or waste disposal methods.

In addition to the decision options mentioned above, the Industrialist must make other important decisions each cycle. He will be asked, as part of the elite of the community, to vote on public issues which arise in the newspaper and which call for an Elite Opinion Poll. He must also pay property taxes or risk having his land confiscated, and he must make payments on any outstanding loans or risk a drop in credit rating.

As a member of the community's elite, the Industrialist will be asked to vote on general obligation bonds and special millage requests during the game. He may lend or give money to other players. He may have to work with the Planners and Politicians to achieve a rezoning required for plant expansion or relocation. He may make campaign contributions for or against a Politician's re-election, and for or against a bond issue or special millage sought by a Politician. He may also run for election himself and challenge one of the incumbent Politicians.

In summary, the major activities of the Industrialist are as follows:

-- Read the newspaper and vote in the Elite Opinion Poll

-- Pay taxes or risk confiscation of property

-- Make payments on outstanding loans or risk losing credit rating

-- Estimate potential market

-- Make trend estimates of, and then set, desired sales volume, sales price, production level, and operating costs

-- Decide on equipment and plant expansion, land purchases and rezoning if necessary

-- Take out loans to finance activities

-- Commission a consultant survey of plant emissions and effluents

-- Commission a consultant survey of emission control and effluent treatment methods and costs

-- Comply or resist EQA's pollution control requests

-- Make a request for variance or a legal appeal for relief

-- Transfer cash to, or receive cash from, other players

-- Make campaign contributions

-- Vote on bond issues or requests for special millage

-- Purchase land for expansion (but only with a Developer serving as his broker).

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CHAPTER 4

Annotated Worksheet

Chapter 4

ANNOTATED INDUSTRIALIST WORKSHEET

The Industrialist worksheet has six main parts: (1) The Elite Opinion Poll, (2) Income and Operating Cost Estimate, (3) Profit and Income Tax Estimate, (4) Capital Expenditure Estimate, (5) Cash In-Cash Out (Cash Flow) Estimate and Estimated New Loan Requirements, and (6) News Releases to News Media.

The worksheet is primarily a bookkeeping convenience and guide to assist you in determining the financial status of your company's operations and reach reasonable decisions about optimizing its operation. You do not necessarily have to follow the order of the worksheet; you may make decisions in any order that is logical to you. However, you will be asked to fill out and turn in a worksheet each cycle so that the effect of your decisions on your business and on the community of APEX can be recorded by the computer.

Among the decisions you will make, certain ones will be of special importance to the basic operation of your business. These include:

1. Sales price per unit of your product.
2. Estimated sales in units expected.
3. Production level.
4. Fuel type used.
5. Desired inventory carryover.
6. Plant maintenance costs.
7. Loan payments.
8. Property tax payments.
9. Desired tax depreciation allowance.
10. New Loan requests.
11. Amount of dividends recommended to Board of Directors.
12. Public relations news releases representing your interests.

There are a multitude of other important considerations and decisions you will probably wish to make, such as, capital expenditures for plant expansion or pollution control equipment, and cash transfers and campaign contributions to other players reflecting "deals" you have made with them.

For all of these decisions your worksheet will be the official record of your actions and decisions as Plant Manager of your industry. (Your role advisor or other designated agent will act as your Board of Directors representing the capital investment of your industry's stockholders.)

ELITE OPINION POLL

Each year certain issues with accompanying alternative choices of action will appear in the METRO-APEX NEWS which require decisions from all role players, acting as the "elite" or leadership of the community. In some cases the decision of the elite is binding on the Politicians and the poll can be considered the same as submitting a referendum to the voters. Here the newspaper will read "DECIDED BY OPINION POLL MAJORITY." In other cases, the decision of the elite is merely advisory, and the Politicians can decide whether or not to heed their mandate. Here, the newspaper will read "POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED."

The outcome of the vote will be recapitulated in the next cycle's newspaper. For each issue outcome, the newspaper will also print the reactions of five interest groups--Civil Rights Groups, Effective Government Groups, Business Community, Labor Vote and Right-Wing Conservatives.

> Example: (this example is for illustration purposes only and does not appear in the Cycle 0 newspaper.)

Pressure Group Response to Last Years Issue Decisions

Issue No.	Alter. Chosen	Civil Rights	Effective Gov't	Business Community	Labor Vote	Right-Wing Conserv.
42	1	0	3	4	0	-1

The response numbers range from -4 to +4 indicating general extent of support or non-support.

Players should vote on all issues in the Elite Opinion Poll, including those in the Business Page, by choosing one of the listed alternatives Each role will have one vote. In the cases where there is more than one person in a role, they will have to come to an agreement.

The Elite Opinion Poll is especially important to Politicians because their actions relative to the poll may affect their chances for re-election.

> Instructions: Indicate your role and your industry number and the cycle number at the top of the page. Put the issue number in the left hand column (this should not be confused with a project number), and the number of the alternative chosen in the adjacent column.

Example:

Issue No.	Alternative
42	2
1	3

INCOME AND OPERATING COST ESTIMATES

I. ESTIMATED INCOME

The income of your industry for next cycle can be estimated from the sum of Interest on Cash Available, Product Sales, Cash Transfers (to you from other players), Income from Land Sales and Return on Investments in Exofirms.

A. Interest on Cash Available

The cash available for the upcoming cycle is found in the "CASH IN-CASH OUT STATEMENT" of the printout under Section VI. The interest rate on this cash carryover is set permanently at 5%.

Instructions: Multiply the cash available by the interest rate of 5% to calculate the total interest on cash available.

Example:

A. Interest on Cash Available	
1. Cash Available for Next Cycle	$ 250,000
2. Interest Rate (5%)	x .05
3. Total Interest on Cash Available	$ 12,500

B. Product Sales

Decisions in connection with product sales are all interrelated; however, a good place to begin is with the establishment of a unit sales price. (The Power Plant is an exception here because it is a publicly regulated utility; it submits all proposals for rate changes to the Public Utilities Commission for their approval.) To help in setting a sales price there is a comparison of the firm's unit price with the average industry wide price for the past three years in the printout under "SALES INFORMATION", and a graph of past cycles in Chapter 6 of the manual. There are also newspaper headlines referring to the state of the national economy which may be indicative of demand potential. Once the sales price is set, an estimate can be made of the number of units to be sold in the coming year. Three factors determine your actual sales: (1) the state of the national economy, (2) the state of the local economy, and (3) the difference between the price set and the average for the industry. A multiplication of the units sales price times estimated number of units to be sold results in the estimated revenue from product sales.

The next step concerns the setting of an inventory carryover. There is a cost associated with each unit of inventory carryover which covers expenses such as warehouse rental and moving fees. This can be found under "COST FACTORS" in the printout in Section E. In some cases, employee wages and material and fuel costs are rising so rapidly that it is wise to build up a large inventory despite the carrying costs. Each Industrialist must determine his own optimum inventory carryover. The desired inventory carryover added to the estimated unit sales yields the total units needed for the coming year. If there is an inventory carryover from the previous year, this is subtracted from the total units needed to give the estimated number of new units that must be produced in the coming year. The inventory carryover from the previous year can be found under "PRODUCTION INFORMATION" in the printout. It is the number of units produced that year plus inventory carryover from a year prior to that, minus actual sales; i.e., units produced + inventory carryover minus actual sales = inventory carryover to next cycle.

It should be noted that no Industrialist can sell more of his product than he can produce in a given year, plus whatever he carries over from the previous year in inventory. (Note: the Power Plant is an exception, since it can purchase power from outside sources if the demand is greater than its capacity). Each industry is limited in the total amount it can produce in a year by the plant capacity in existence at the beginning of the year. Thus, plant size determines the maximum production capacity for the year, which may be found under "PRODUCTION INFORMATION" in the printout.

Maximum production can, at times, be influences by other factors. For instance, the Cannery can only produce (process and can) those farm products which it can buy from the farmers. If fruit and vegetable yield for a particular year decreases due to bad weather or crop damage from high levels of pollution, the cannery may find that it's ability to produce is reduced for that year. Labor strikes may also reduce an industry's maximum production.

The maximum production capacity can be increased by purchasing additional production equipment, which requires additional building, which in turn requires additional land. (See "Background Information for Industrialist Role" - Chapter 6 of this manual).

Each Industrialist should check his estimated production level for the coming year to see that it does not exceed the maximum production capacity for the year. By comparing the production capacity to the percent of capacity presently in use, the Industrialist can decide whether or not expansion is desirable. If the decision is made to expand, the section of the Industrialist Worksheet labeled "Capital Expenditure Estimation" must be completed to initiate the appropriate expansion purchases. However, there will not be an increase in production capacity until the following year, because of the time lag associated with the construction of additional plant facilities.

Instructions: Establish a unit sales price and estimate sales (the number of units to be sold). Multiply to get estimated total income from sales. Add the desired inventory carryover to estimated unit sales to determine the total units needed. Subtract inventory on hand from last year to get the estimated production level. Check to see that this does not exceed maximum production capacity.

Example:

B.	Product Sales			
1.	Sale Price ($ per unit)		$ 3.20	
2.	Estimated Sales (units)	x	3,200,000	
3.	Total Income from Sales ($)			$10,240,000
4.	Estimated Sales (units)		3,200,000	
5.	Desired Inventory Carryover (units)	+	100,000	
6.	Total Units Needed		3,300,000	
7.	Inventory Carryover	-	200,000	
8.	Estimated Production Level (units)		3,100,000	
9.	Maximum Production Capacity (units)	-	3,500,000	
10.	Desired Increase in Max. Production Capacity		0	

If the calculation determines that an increase in maximum production capacity is desired, go to the "Capital Expenditures Estimation" section of the worksheet and enter the amount of increase desired. This section will help you to calculate the cost of such expansion. (This additional capacity will not be available until the following year.)

C. Cash Transfers (from other players)

The receipt of cash via a cash transfer should be recorded here. (The player transferring the cash should also record it under cash transfers to other players). The reasons for cash transfers between players are many and varied. They can represent fees for services rendered, indirect campaign contributions, loan agreements between players, and so forth. The results of cash transfer activities will be recorded under "MISCELLANEOUS NOTES" and under "INCOME CALCULATED DURING CYCLE" Section I-C) in the printout.

Instructions:

Indicate the player's role in the first column, the total amount of the cash transfer in the second, and the reason for the transfer in the third. Then total all estimated cash transfers.

Example:

C. Cash Transfers (from other players)

From Player	Transfer Amount	Reason
Dev. 2	$5,000	Loan
Dev. 5	$ 200	Consulting Services

Total Cash Transfers (from other players) $ 5,200

The total cash transfer from other players may be entered in Section Iv-B,1 of the worksheet where it will be used later to calculate cash requirements and loans required to pay the industry's bills which are due at the beginning of the next cycle (i.e., property taxes, interest payments, etc.)

D. Land Sales (to market or other players)

One source of income for the Industrialist is through the sale of land. The Industrialist's present land holdings are listed under "CURRENT PROPERTY HOLDINGS AFTER CYCLE ___" of the printout. It is possible for an Industrialist to buy and sell land to the market or to other game players. Land dealings can be handled through any of the Developers in the game. The fee for the service provided by the Developer is negotiable and can be paid through cash transfers.

If a Plant Manager wishes to sell 1.0 acres of vacant residenti land which he ownes, the following entry must be made in his worksheet.

Instructions: In column 1 indicate the analysis area in which the land is located; in column 2, whether it is vacant or developed; and column 3, the zoning category of the land. This information can be found on the printout under "CURRENT PROPERTY HOLDINGS."

Column 4 names the player to whom you are selling the land. Columns 5 and 6 contain the number of units or acres to be sold; column 7, the agreed price per unit or per acre; and column 8, the product of the number of units or acres and the price per unit or acre. The sum of column 8 is the total expected income from land sales.

Example:

D. Land Sales (to market and other players)

AA	Vac/ Dev.	Zone Cat.	Buyer	No. of Units	(or) No. of Acres	Price/Acre Price/Unit	Total Price
5	vac.	Res	Dev.7		1	$8,000	$8,000

Total Income from Land Sales $ 8,000

(The price per acre or per unit is dependent on current market prices or a negotiated price with other players.)

Note: This Industry ownes 27.5 acres of Exogenous Industrial land in AA 23 (See Annotated Printout, Chapter 8 "CURRENT PROPERTY HOLDINGS AFTER CYCLE __"). On the printout page titled "PRODUCTION INFORMATION" he will note that his "INVENTORY OF PHYSICAL FACILITIES" indicates that the 27.5 acres is the property occupied by his plant. He will not want to see this property unless he decides to demolish his production facilities.

E. Estimated Return from Exofirm Investments

Another way in which the Industrialist may profit is through investing in Exofirms. A more complete explanation of the investment process is described later under "Estimated Operating Costs", Section II-T. Once investments are made, you will want to estimate your return. Actual investment returns for each cycle can be found on the printout under "MISCELLANEOUS NOTES" and "INCOME CALCULATED DURING CYCLE" (Section I-E).

Instructions: You will want to anticipate a return ranging from 5 to 15% over the actual investment. Indicate the Exofirm Number (as stated in the Business section of the newspaper) in the first column. In the second column indicate the amount invested, and in the fifth column your estimated return (amount invested plus anticipated return). Total column 5 to get your Total Estimated Returns on Exofirm Investments.

Example:

E. Estimated Return from Exofirm Investments

Exofirm No.	Amount Invest	A.A. No.	Exofirm Name	Estimated Return
8	25,000	5	Zippy Foods	$26,250

Total Estimated Return on Exofirm Investments $ 26,250

TOTAL ESTIMATED INCOME

Add all of the income for items I-A through I-E to get your Total Estimated Income. $10,291,950

II. ESTIMATED OPERATING COSTS

There are many factors that contribute to operating costs: Labor Costs, Material Costs, Fuel Costs, General Administration Costs, Inventory Carrying Costs, Pollution Controls Operation, Plant Maintenance, Consultants for Air Pollution Emission and Water Effluent Data, Consultans for Air and Water Pollution Control Systems Data, Loan Payments, Property Taxes, Cash Transfers (to other players), Campaign Contributions, Zoning Application Fees, Demolition Costs, Cost of Purchasing Water, Cost of Municipal Sewage Treatment, Cost of Removing Solid Wastes and Exofirm Investment Costs. Each of these is described below.

A. Labor Costs

For each industry there is a fixed ratio between the production level and the number of employees. This ratio can be found in this manual under "Background Information for the Industrialist Role", Chapter 6. The Industrialist does not have an independent decision on the number of people he will employ. When the production level is set, the employment level is also determined. Normally, the Industrialist does not have an independent decision concerning employee wages either. The average annual wage for each industry is indicated in the printout under "COST FACTORS", part A. This will change each year. If a Labor Union Representative approaches the Industrialist, he may be required to reach a negotiated wage rate different than the average annual wage listed under "COST FACTORS." If no agreement is reached, it is possible that Labor may call a strike and thereby reduce the Industrialists production output.

Instructions: Take the employment/production ratio (from Chapter 6) for your industry and multiply it by the "Estimated Production Level" (worksheet Section I-B,3) to estimate the number of employees. (Always round up where there is a fraction.) Multiply the number of employees by the average annual wage (from printout "COST FACTORS") for that year. The result is the total labor cost.

Example:

A. Labor Costs
1. Estimated Production Level 3,100,000
2. Employment/Production Ratio x .0001
3. Number of Employees 310
4. Average Annual Wage x $ 8,000

5. Total Labor Costs $2,480,000

B. Material Costs

There are material costs associated with each unit of production for every industry except the Power Plant. The unit material costs for each cycle can be found in the printout under "COST FACTORS", Part B.

Instructions: Multiply estimated production level by unit material costs to get total material costs.

Example:

B. Material Costs

1. Estimated Production Level 3,100,000
2. Material Costs/Product Unit x .55

3. Total Material Costs $1,705,000

C. Fuel Costs

With the exception of the Iron Foundry, each industry has several fuel options. These are enumerated under Part C of "COST FACTORS" in the printout. The fuel type presently in use can be found under Part N; however, there are several reasons why you, as an Industrialist, may want to change this. You may find that a fuel change will reduce production costs, pollution emissions, etc. The different fuel costs per unit of production are given in the printout under "COST

FACTORS", Part C. The costs associated with equipment conversion from one fuel type to another are included in these unit fuel costs, amortized over ten years. The percent of sulfur and the ash content for each fuel type is given in "Background Information for Industrialist Role", Chapter 6.

Instructions: Indicate the fuel type you have selected. Then take the associated unit fuel cost and multiply it by the estimated production level to get the total fuel cost.

Example:

C. Fuel Costs

1.	Fuel Type Selected		Low Grade Coal	
2.	Estimated Production Level		3,100,000	
3.	Fuel Cost/Product Unit	x	$ 0.14	
4.	Total Fuel Costs			$ 434,000

D. General Administration Costs

The General Administration Costs per product unit can be found in the printout under "COST FACTORS", Part D. Along with average wage, material and fuel costs, the general administration costs will change annually and should be checked each cycle.

Instructions: Multiply estimated production level by general administration costs per product unit to get the total administration costs.

Example:

D. General Administration Costs

1.	Estimated Production Level		3,100,000	
2.	General Administration Cost/Product Unit	x	0.70	
3.	Total Administration Costs			$2,170,000

E. Inventory Carrying Costs

Any product unsold during the year will be carried over into the next year as inventory. (See the discussion of inventory under "Product Sales", Section I-B of this chapter of the manual.) There is a charge per unit of inventory carryover listed in Part E under "COST FACTORS" in the printout.

Instructions: Indicate the desired inventory carryover (from Section I-B, Item 5 of the worksheet) and multiply it by the unit "Inventory Carrying Cost per Product Unit" to get the Total Inventory Carrying Costs.

Example:

E. Inventory Carrying Costs

1.	Desired Inventory Carryover	100,000	
2.	Inventory Carrying Costs/Product Unit	x $ 0.20	
3.	Total Inventory Carrying Cost		$ 20,000

F. Air Pollution Controls Operations Costs

There are annual operating expenses associated with each air pollution control system in operation in a given year, including those to be installed during the year. Information on new controls may be obtained from a consultant survey (Section II,I,1 of the worksheet). If this survey is purchased, there will be information required in the printout labeled "POLLUTION CONTROL DATA" reporting the annual operating cost for each control system. Information on previously purchased controls can be found in the printout under "INVENTORY OF PHYSICAL FACILITIES."

There are three possible operating states for control systems: the first is the absence of a control system, indicated by no control system information in the printout. The second is a control system installed and operating, indicated by a positive control number (i.e., Control System 23); the third is a control system installed, but not operating, indicated by a negative control number (i.e., Control System -23). The player must decide whether or not to operate his equipment each cycle.

Instructions: In column 1 indicate the number of the production sub-process for which a control device exists or will be purchased this cycle. (A description of these sub-processes can be found in this manual under "Background Information for Industrialist Role", Chapter 6.

In column 2 specify the control number; in column 3 the control name, and in column 4 the estimated production level next cycle. Use column 5 for the per unit production operating cost of the control. Column 4 multiplied times column 5 gives the annual operating cost for each control. Then sum the annual operating costs for all controls.

Control system information for columns 2, 3 and 5 can be purchased in a consultant survey as described in Section II-1,1 of this chapter.

Example:

Production Sub-Process No.	Control No.	Control Name	Estimated Production Level/Units	Per Unit Operating Cost	Annual Operating Cost
4	23	Baghouse	3,100,000	0.0039	$12,090

Total Air Pollution Controls Operating Costs $12,090

G. Plant Maintenance

Each year, plant and equipment "wear and tear" causes a decrease in the production capacity of the plant unless balanced by plant maintenance expenditures. Without these expenditures, production capacity will decline at a rate of 8% per year. To maintain the present capacity, the plant maintenance rate is 8% of the value of your buildings and equipment. This value can be found under "COST FACTORS", Item J of your printout. If plant maintenance expenditures are not made, production capacity will permanently decrease next year.

Example:

G. Plant Maintenance Cost $ 600,000

H. Consultants Cost - Air Pollution Emission Data

For a fee of $5000 you can hire an engineering consultant to perform stack sampling and analysis tests on all of the combustion and production processes of your industry. The consultant will provide information on the air pollution emissions, measured in lbs/hr, for five pollutants--particulates, sulfur dioxide, carbon monoxide, nitrogen oxides, and hydrocarbons. You will also be given the smoke emissions in Ringelmann numbers and the odor in Stinkelmann units. This information may differ from the emission estimates made by the air pollution control authorities.

If a consultant survey is not ordered, it is possible to estimate emissions using the emission factors discussed in Chapter 6 of this manual. However, these estimates of emissions are only rough figures which have limited value in court. When a consultant for pollution emission data is purchased, the information can be used in court. Such information when purchased appears in the printout.

Note: See Annotated Printout, Chapter 8, "EMISSION DATA FROM SURVEY PURCHASED IN CYCLE 1."

Instructions: If the consultant data on air pollution emissions for the processes of your industry is desired, enter the $5000 consultant fee in your worksheet.

Example:

H. Consultant Cost-Air Pollution Emission Data $ 5,000

I. Consultant Costs - Pollution Control Systems

1. Air Pollution Control Systems Data

For a fee of $5000, a consultant will provide you with information about the various air pollution control systems available for your industry. The air pollution control authorities may provide some general data on controls and the costs associated with them, but to get the specific data on controls for a particular plant, one must obtain a consultant survey. In some cases there are no controls available for a particular production sub-process, and in other cases there are several to choose from. Controls will vary in initial investments cost, annual operating costs, and control efficiency.

Note: For an example of the type of information provided by the consultant for control systems data, see Annotated Printout, Chapter 8, "AIR POLLUTION CONTROL SYSTEM DATA PURCHASED BY (INDUSTRIALIST) FOR $5000.

Each figure under the section labeled "CONTROL EFFICIENCY", refers to the percent that a particular control will reduce a particular pollutant for a single production sub-process. If, after studying the control systems data, a decision is made to install some control equipment, entries must be made in the "Capital Expenditure Estimation" section of the worksheet.

Instructions: If you wish the consultant study and data on air pollution control systems for all of the processes in your plant, enter $5000 in your worksheet.

Example:

I.1. Air Pollution Control System Data	$ 5,000

2. Water Pollution Control Equipment Data

For a fee of $5,000, a consultant will provide you with information on the water pollution control treatment systems applicable to your plant. This information includes the control number, system name, capital cost, yearly operating cost and pollution control efficiency for 6 types of water pollutants.

Instructions: If you want the water pollution control equipment consultant study and data for your plant, enter $5000 in your worksheet.

Example:

I.2. Water Pollution Control Equipment Data	$ 5,000

Then total the control equipment consultant study costs (1 and 2 above).

Total Control System/Equipment Data Costs	$ 10,000

J. Loan Payments

Payments due each year on any outstanding loans are listed on the printout under "OUTSTANDING DEBITS", Part B. Each minimum payment due includes both principal and interest. The printout shows the number of years left to pay off the loan, the interest rate, and the balance due. To pay off a loan early, payment of the balance due plus one year of interest is required. For example, a loan with a balance due of $300,000 and an interest rate of 6.0 percent with two years left to run needs a payment of $318,000 to erase the indebtedness. If, on the other hand, the minimum loan payment is not met in a cycle, there will be an underpayment penalty which will increase in severity for each payment not met. A repeated failure to meet loan payments will affect the Industrialist's credit rating, and hence the interest rates applied for future loans will be higher. (See Glossary for "Interest Rates").

Note: See Annotated Printout, Chapter 8, "OUTSTANDING DEBITS."

Instructions: In column 1 of the worksheet, enter the number of the loan assigned by the computer (found on your printout). In column 2 enter the amount of the loan payment, and then total all loan payments.

Example:

J. Loan Payments

Loan Number	Payment Amount
3	$202,020

Total Loan Payments $ 202,020

K. Property Taxes

Each Industrialist must pay taxes to the jurisdiction in which his plant is located as well as to the County. If land is purchased in other jurisdictions, property taxes must be paid there too. Failure to pay taxes results in a penalty of 6%. There is also the risk that property may be confiscated by the jurisdiction in which taxes are owed. The taxes due each cycle to the various jurisdictions are recorded on the printout under "OUTSTANDING DEBITS", Part A. The tax rate is set by the Politicians.

Note: See Annotated Printout, Chapter 8, "OUTSTANDING DEBITS."

Instructions: In column 1, enter the jurisdiction to which taxes are to be paid, and in column 2, the amount to be paid. The sum of these payments is the total payment for property taxes.

Example:

K. Property Taxes

Jurisdiction	Payment Amount
Township 1	$14,025

Total Property Tax Costs $ 14,025

Note: The Annotated Printout, Chapter 8, shows that this payment was insufficient to cover taxes due in Township 1, therefore, a delinquent payment plus 6% interest is due next cycle. The other taxes due in Chapter 8 are for newly purchased property.

L. Cash Transfers (to other players)

Cash transfers are used for many different purposes. One common use is to pay a Developer a commission for buying or selling land for you. Another common use is for making loans between players. A third use is to pay for space in the METRO-APEX NEWS or for broadcasting time which can be used to advertise products, make campaign speeches, or publicize activities. A record of all cash transfers to other players appears under "MISCELLANEOUS NOTES" and the total under "OPERATING COSTS", Section II-L in the printout.

Instructions: Enter the name of the recipient of the cash transfer in the first column, the amount of the cash transfer in the second column, and the reason in the third. The reason for the transfer is not a required entry.

Example:

L. Cash Transfers (to other players)

To Player	Reason	Transfer Amount
Dev. 6	Consulting Serv.	$600
News Media	2 lines in paper	$200

Total Cash Transfers to Other Players $ 800

M. Campaign Contributions

Campaign contributions can be made for or against incumbent Politicians. As an Industrialist, it is possible to run for election yourself by challenging one of the Politicians. To run for election, one must simply declare an intent to run and enter your name on the ballot at the time designated by the Game Overall Director.

A campaign contribution against the incumbent is a contribution for the opponent. In addition to contributions for Politicians, it is possible to make contributions for or against bond issues or special millages. The bond or millage numbers must correspond to numbers on the bond and special millage requests submitted by the Politicians. Campaign contributions given by a firm or corporation may be illegal--check with the Game Overall Director for the proper current law. If legal, but a dollar limit is imposed, more than one contribution may be made by contributing separately to the Politician (or opponent) and to other parties and organizations supporting that person's candidacy. If an illegal contribution is given and another player (such as the News Media) discovers it, the Plant Manager or Industry may find itself charged with violation of election laws and be subject to legal prosecution.

Instructions: In column 1 enter the target of the contribution (the Politician or the bond or special millage number). In column 2 or 3 indicate with an "x" whether it is for or against the Politician, bond or special millage. In column 4 enter the contribution amount. Then total all contributions.

Example:

M. Campaign Contributions

Pol/Bond/Mill No.	For	Against	Contribution Amount
Co. Pol-Twn. 1	x		$5,000
Bond No. 105		x	$2,000

Total Campaign Contributions $ 7,000

N. Zoning Application Fees and Demolition Charges

There is a fee of $100 charged for each rezoning request. All land that is used for plant expansion must be zoned vacant industrial before it is developed. Assistance may be secured from the Developers in land transactions and zoning. When your developed property is rezoned, a demolition charge of 5% of the land value is charged, and the property becomes vacant. Zoning application forms can be obtained from the Planners and they will assist you in filling them out. The Planners will schedule an open hearing on zoning with the Politicians, who will make the final determination.

It should be noted that all rezoning requests should have the Planner's recommendation and must have the signatures of the majority of the appropriate Politicians (the majority of the City Politicians if the land is within City limits, or the majority of the County Politicians for all other land). Rezonin requests can be submitted by the Industrialist only for land that he owns. Any rezoning actions will be recorded under "MISCELLANEOUS NOTES" in the printout. The "CURRENT PROPERTY HOLDINGS" also reflect all zoning changes.

Instructions: In column 1 record the analysis area of the land you would like to have rezoned and in column 2 indicate whether this land is presently vacant or developed. Then in column 3 indicate the present zoning category, or the developed land use type, whichever is appropriate. Column 4 should contain the desired new zoning category. (Note that when property is rezoned, it automatically becomes vacant.) Column 5 should show the number of units of the land if it is developed residential. If it is developed non-residential or vacant indicate the number of acres in column 6. A fee of $100 goes in column 7. (Note: This form is not a rezoning request. It is merely a record of the costs of zoning requests that you have submitted through the Planners.)

Example:

N. Zoning Application Fees and Demolition Costs

A.A.	Vac/ Dev.	From	To	No. of Units	(or) No. of Acres	Fee
5	vac	Res.	Ind.			$100
10	dev	C-R	Res			$100

Total Zoning Application Fees	$ 200

Demolition Costs

1. Value of Developed Land Being Rezoned		$ 171,000
2. Rate of Demolition Fees	x	.05
Total Demolition Costs		$ 8,550
Total Zoning and Demolition Costs		$ 8,750

O. Water Pollution Effluent Data - Consultant Cost

For a fee of $5,000 you can hire an engineer to measure and provide you with data on the volume of your plant's water effluent and its pollutant content. The consultant's data will appear in next cycle's printout. Information will be provided on six pollutant types; these are temperature, disolved oxygen, biological oxygen demand, nutrients, total disolved solids and coliform.

Instructions: If you want to order the water pollution effluent consultant study on your industry, enter the $5,000 cost for the study in your worksheet.

Example:

O. Water Pollution Effluent Data - Consultant Cost $ 5,000

P. Water Pollution Control Equipment Operation Costs

There are annual operating expenses associated with each type of water pollution control equipment in operation in your industry in a given year. Data for the control numbers, names, operating costs and equipment control efficiency can be determined by the consultant study described in the worksheet, Section II, Part I,2 above. The operation of this equipment and the calculation of annual operating costs are the same as previously described for air pollution control equipment operations in Part F above. The only exception is that since the water pollution control equipment is applied to all of the water effluent existing in the industry, it will operate for all applicable production sub-processes and the specific sub-process need not be specified in the worksheet. (Compare Part II-F for Air Pollution Control Operation and II-P for Water Pollution Control Equipment Operation in the worksheet.)

Q. Cost of Purchasing Water

All industries use water in their operations. The quantity and quality of water needed varies from industry to industry. Some industries purchase pure water from the municipal water supply while others pump their water directly from an adjacent river. The water requirements in gallons per product unit and the source from which the industry draws its water is described in Chapter 6 of this manual. The current cost per gallon for water purchased from the municipal supply can be found under Item O of the "COST FACTORS" in the printout.

Instructions: To estimate the cost of water for the coming year check Chapter 6 of this manual to see if your industry uses river or municipal water. If water is purchased from the municipal supply, calculate the cost as follows.

Example:

Q. Cost of Purchasing Water

1.	Estimated Production Level (units)		3,100,000	
2.	Water Volume per Unit Production	x	.015	
3.	Estimated Water Use (1000 gals.)		46,500	
4.	Water Cost per 1000 Gals.	x	0.32	
5.	Total Cost of Purchasing Water			$ 14,880

R. Cost of Municipal Sewage Treatment

Most of the process and utility water taken in by the industry during the year picks up contaminants during use and is disposed of by dumping it down the sewer or back into the river. In some industries additional contaminated water is generated by the industrial processes and is also dumped. The sum of these two quantities of used water represents the water effluent from the plant. If this effluent water is sewere into the municipal system and sent to the sewage treatment plant, the industry is charged a yearly fee based on the quantity of effluent discharged.

The water effluent per unit of production is in Chapter 6, "Background Information for Industrialist Role", of this manual. The current charge for sewage treatment per gallon of effluent is found in the printout under "COST FACTORS", Part R.

Calculate the cost of sewage treatment for your industry in the worksheet.

Example: (This calculation is an example only; the Annotated Printout in Chapter 8 does not show this industry connected to the sewage treatment plant.)

R. Cost of Municipal Sewage Treatment

1.	Estimated Production Level (units)		3,100,000	
2.	Effluent Volume per Unit Production	x	0.005	
3.	Estimated Effluent Volume (1000 gals.)		15,500	
4.	Sewage Treatment Cost per 1000 Gals.	x	$ 0.32	
5.	Total Cost of Sewage Treatment			$ 4,960

S. Cost of Removing Solid Wastes

The expense of hauling away and disposing of solid wastes generated by an industry is part of its yearly operating costs. The solid wastes generated by the industry last cycle are shown in the printout under "COST FACTORS."

Example:

Solid Waste Generated

1.	Industrial Processes	0	tons
2.	Recovery from Air Pollution Control	341	tons
3.	Recovery from Water Pollution Control	0	tons

The Industrial Plant Manager may want to estimate his solid waste removal costs for the current cycle. The amount of solid wastes that will be generated from Industrial Processes (Item 1 in the above example) can be estimated by multiplying the solid waste from last cycle by the ratio of this years estimated production level to last years.

Estimated Industrial Solid Waste This Cycle =

$$\text{Industrial Solid Waste Last Cycle} \times \frac{\text{Production Level This Cycle}}{\text{Production Level Last Cycle}}$$

If air pollution control systems or water pollution control systems are installed, additional solid wastes may be generated. For instance, a baghouse for particulate (dust) control or a settling lagoon for total disolved solids removal (sludge) may increase the total solid waste generated by the industry. For the method of estimating the additional solid waste generated, see Chapter 6 of this manual.

The cost of solid waste removal can be estimated in the worksheet from the estimated solid waste generated and the solid waste removal fee in $ per ton listed in the printout under "COST FACTORS", Item Q.

Example:

S. Cost of Removing Solid Waste

1.	Solid Waste Generated-Industrial Process (tons)		0
2.	Solid Waste Recovery-Air Pollution Controls (tons)	+	341
3.	Solid Waste Recovery-Water Poll. Controls (tons)	+	0
4.	Total Solid Waste Generated (tons)		341
5.	Solid Waste Removal Cost Per Ton	x	$ 4.50
6.	Total Cost of Removing Solid Waste		$ 1,535

T. Investment in Exofirms

Investment in Exofirms is normally more a function and interest of the Developers than any other role. However, an Industrialist looking for additional income or working with a Developer or Politician to increase growth in a certain area of APEX, may invest in these firms.

An Exofirm is any firm or exogenous industry which depends upon markets outside the local area for its growth and vitality. Each cycle the Business Page of the METRO-APEX NEWS lists "NEW FIRMS PLANNING TO COME TO APEX." Many of these new firms will list investment opportunities for a Developer or Industrialist. An investment may be made only in those firms which specifically note an investment opportunity, and the investment may not exceed the amount specified.

The newspaper will list data regarding the firm and conditions which must be met before the firm can locate in APEX County. The name and number of the Exofirm are listed along with up to 3 preferred locations. A firm does not necessarily have to locate in any one of these 3 areas. With Politician and Planner approval, a firm may be located in any of the 29 analysis areas. A Developer or Industrialist may initiate the location change, however.

In order for a firm to enter APEX, the Politicians must meet the conditions outlined in the paper, i.e., streets, sewers, and/or rezoning in the analysis area in which the firm will locate. A Developer or Industrialist must also invest where there are investment opportunities, if the firm is to enter.

You need not be concerned about owning or purchasing the necessary acres of land for a firm to locate. Assume the firm has purchased options on this land prior to the public announcement.

Exofirm investments are recorded under "MISCELLANEOUS NOTES" and under "OPERATING COSTS" (Section II-T) on your printout.

Instructions: In the first column, list the Exofirm number as given in the METRO-APEX NEWS. In the second column indicate the preferred location, in the third column the Exofirm name, and in the fourth column the amount invested. Finally, total all Exofirm investments.

Example:

T. Investment in Exofirms

Exofirm No.	Preferred Location	Exofirm Name	Amount Invested
3	5	Zippy Foods	$25,000

Total Investment in Exofirms $ 25,000

TOTAL ESTIMATED OPERATING COSTS

Total Estimated Operating Costs may now be calculated by adding the totals of Section II, "Estimated Operating Costs," Items A through T. $7,715,100

III. PROFIT AND INCOME TAX ESTIMATES

Gross profit is the difference between the estimated total income (calculated in the worksheet, Section I) and the estimated total operating costs (calculated in the worksheet in Section II).

Net profit is the remaining profit after Federal and State income taxes. Before calculating income taxes the Industrialist has the option of claiming a tax depreciation allowance on the accumulated depreciation of his buildings and equipment. (See Glossary for definition of Tax Depreciation.) The tax depreciation allowance rate is set at 5% of the value of buildings and equipment; however, the Industrialist may choose to carry over this allowance and claim the accumulated total during some later cycle. The maximum allowable claim for tax depreciation is printed under "COST FACTORS", Part H, in the printout.

The tax depreciation allowance claimed during any single year is subtracted from gross profit to give the total taxable income. At this point Federal and State income taxes are determined at a rate of 55% of the total taxable income. Subtracting these taxes from the total taxable income yields an estimate of the net profit for the cycle.

The Plant Manager will want to assure that his operation of the industry produces a reasonable profit. First, he must assure that there is sufficient profit to pay dividends to the stockholders. If year after year the stockholders do not get a return on their investment at least as good as they could earn by putting their money in other investments (such as a bank, savings and loan institution or other industry), the firm will not be able to get additional money from investors when needed for large capital expenditures such as plant expansion and purchase of new production equipment, etc. Massive and continual borrowing of money through loans will eventually decrease the amount an Industrialist can borrow, since borrowing power depends upon net worth and outstanding loans are debts which decrease net worth.

Instructions: Enter the Total Estimated Income and Total Estimated Operating Costs from Section I and II of the worksheet. The difference is the Estimated Gross Profit. Subtract the desired tax depreciation allowance to determine the total taxable income. Federal and State income taxes may then be calculated at 55% of taxable income. Subtracting income taxes from gross profit results in estimated net profit for the cycle.

Example:

III. PROFIT AND INCOME TAX ESTIMATES

A. Gross Profit Estimate		
1. Total Estimated Income e	$10,291,950	
2. Total Estimated Operating Costs	- $ 7,715,100	
3. Estimated Gross Profit		$2,576,850
B. Tax Depreciation Allowance		
1. Maximum Tax Depreciation Allowance	$ 375,000	
2. Desired Tax Depreciation Allowance		- $ 375,000
C. Total Taxable Income		$2,201,850
D. Federal and State Income Taxes		
1. Total Taxable Income	$ 2,201,850	
2. Federal and State Income Tax (55%)	x .55	
3. Total Estimated Taxes		$1,211,018

E. Estimated Net Profit

1. Estimated Gross Profit	$ 2,576,850	
2. Total Estimated Taxes -	$ 1,211,018	
Total Estimated Net Profit		$1,365,832

CAPITAL EXPENDITURES ESTIMATION

A. Desired Increase in Maximum Production Capacity

The decision to increase maximum production capacity revolves around several interrelated factors. For each industry, there is a set ratio between equipment value and production capacity, between building area and equipment value, and between land area and building area. These ratios can be found in "Background ground Information for Industrialist Role", Chapter 6, and they will remain constant throughout the METRO-APEX exercise. For each Industry, there is also a fixed minimum production capacity increment. Using the above ratios, a corresponding minimum has been established for equipment purchases, building purchases, and land requirement. Again, using the above ratios, it is clear that building area sets a limit on the amount of equipment that can be added; likewise land area sets a limit on the building area that can be added. Under "INVENTORY OF PHYSICAL FACILITIES", the printout shows how much additional square footage of building can be accommodated by the vacant land held by the firm.

Instructions: From the worksheet Section I,B,10 get the desired increase in maximum production capacity and from Chapter 6 get the minimum production, equipment, building and land increments and calculate the equipment, building and land costs required. The following is an example calculation only and is not reflected in the Annotated Printout in Chapter 8 or the sample budget in this annotated worksheet.

Example:

A. Desired Increase in Maximum Production Capacity	540,000
1. Minimum Production Expansion Increment	- 700,000

B. Equipment Expansion Costs

1. Minimum Equipment Increment Cost		$ 700,000
2. Number of Increments Required	x	1
3. Total Equipment Expansion Cost		$ 700,000

C. Building Expansion Costs

1. Minimum Building Increment Cost		$ 800,000
2. Number of Increments Required	x	1
3. Total Building Expansion Cost		$ 800,000

D. Land Purchase Cost

1. Minimum Land Increment		5.5	acres
2. Number of Increments Required	x	1	
3. Land Required for Plant Expansion		6.0	acres

(NOTE: It is usually a good idea to buy an extra .2 to .5 acres over that required in order to avoid buying too little land due to roundoff errors. Land must be zoned vacant industrial and be in the same analysis area as the existing plant.)

Note that it is possible to buy land in any amounts in any cycle without additional investment in buildings and equipment. If there is enough land area, building area can also be increased without adding equipment and, similarly, if there is enough building area, equipment can be added without increasing the level of production. This increase in equipment value will result in a corresponding increase in production capacity, and the new maximum capacity will be indicated on the printout under "PRODUCTION INFORMATION."

There is a one cycle delay between expansion purchases and the time the increased production capacity can be used. It is the Industrialist's job, as Plant Manager, to look not only at the percent of production capacity presently being used, but also to estimate how this will change over the coming cycles. In some cases he must start planning for expansion several years before the increased capacity is needed. For example, there may be no vacant land zoned industrial in the appropriate analysis area. This could necessitate going to the Developers to buy some Market owned land, going to the Planners to see how rezoning requests fit into their master plan, and going to the Politicians to get final approval for rezoning requests. All of these possibilities could result in several cycles of delay. With careful planning, the Industrialist can anticipate the needs of his industry for the coming cycles. In summary, the factors that should be considered in setting a desired increase in production capacity are: (1) equipment expenses, (2) building expenses, and (3) land purchase cost.

4. Summary of Land Purchases and Costs

Information concerning the availability of parcels of land and the appraised and market values can be obtained through Land Developers. If the land is to be used for expansion purchases, a rezoning request to change the land to a vacant industrial zoning category may have to be initiated. Rezoning requests can be obtained from the Planners and must have the approval of the majority of appropriate Politicians in order to be enacted. The Industrialist should record the rezoning request and amount for any rezoning fees in the "Estimated Operating Costs" section of this worksheet.

Industrialists also have the option to engage in some limited land speculation activities. It is possible to make a profit by buying, rezoning, and selling land to the market and/or to other game players. The same section of the worksheet is used whether you are buying land for expansion purposes or for speculation purposes. In either case, a record of the land purchased will appear in the printout under the section labeled "REAL ESTATE TRANSACTIONS." The expenses will also appear as Capital Expenditures on the "CASH IN-CASH OUT STATEMENT."

Instructions: In column 1 enter the name of the player (or market) from whom you are buying land, and in column 2 the analysis area of the land. Use column 3 to show whether the land is vacant or developed at the time of purchase and column 4 to indicate the zoning category or developed land use type. Use column 5 to show the number of units involved if the land is developed residential; otherwise use column 6 to show the number of acres involved. The negotiated or market price per acre or per unit should appear in column 7, and the total price in column 8. Finally, total all land purchases.

Example:

4. Summary of Land Purchases and Costs

Seller	AA	Vac/ Dev.	Zone Cat.	No. of Units	(or) No. of Acres	Price/Acre Price/Unit	Total Price
Dev 7	10	Dev.	C-R		1	211,000	211,000
Market	5	Vac.	Res		2	6,000	12,000

Total Cost of Land Purchases $ 223,000

E. Pollution Control Equipment Purchase Cost

Initial investments in pollution control equipment should be recorded in this section of the worksheet. The purchase of control equipment should be preceded by the purchase of a consultant for air or water control systems data. This consultant survey will provide you with the information necessary to purchase pollution controls for your industry (see Annotated Printout, Chapter 8). In addition to the initial capital investment in control equipment, you must plan for annual operating costs (under Section II-F and P of "Estimated Operating Costs" on your worksheet). After the first year, however, you have the option of not operating the control device. The purchase of pollution control equipment will be recorded on the printout under "INVENTORY OF PHYSICAL FACILITIES", and it will also be recorded under Capital Expenditures on the "CASH IN-CASH OUT STATEMENT."

Instructions: Enter the production sub-process number (Note: not required for water control systems), the control number, control name and initial investment cost in the appropriate column in the worksheet under Part E,1 and E,2 and total all initial investment costs.

Example:

E. Pollution Control Equipment Purchase Cost

1. Air Pollution Control Equipment Cost

Production Sub-Process No.	Control No.	Control Name	Initial Investment Cost
4	23	Baghouse	$55,000

Total Air Pollution Control Equip. Costs $ 55,000

2. Water Pollution Control Equipment Cost (for illustration only--not in Annotated Printout, Chapter 8)

Control No.	System Name	Initial Investment Cost
56	Pump to Sewage Treatment Plant	0

Total Water Pollution Control Equip. Costs $ 0

Then total all capital expenditures and enter total in worksheet Section IV-B,2 and V-C.

TOTAL CAPITAL EXPENDITURES $ 278,000

Enter the total capital expenditure costs in the worksheet.

CASH IN-CASH OUT ESTIMATES (CASH FLOW)

In estimating the need for new loans, a distinction between two types of cash requirements must be made. The first is cash requirements that can be met at any time during the year, and the second is cash requirements that must be met at the beginning of the year.

In addition to estimating the year end income, operating costs, capital expenditures, profits and taxes, the Plant Manager will need to plan ahead in order to have sufficient cash on hand when certain payments are due. Certain payments such as loan payments, property taxes, cash transfer to others, capital expenditures and campaign contributions are paid early in the year before income from product sales comes in. These payments must be made out of cash on hand at the start of the year (i.e., cash carried over from the previous year).

By using the categories under the "CASH IN-CASH OUT" in the worksheet a cash flow picture can be determined, and the cash needed at the beginning of the coming year and the cash carry-over for the next year can be estimated. If there is a cash deficit, a new loan is needed to increase the total Cash In.

Loan Requirements Estimate

The total cash on hand at the beginning of the next cycle consists of the Cash Available for next cycle (see the printout, "CASH IN-CASH OUT", Section VI), 5% interest on cash available, cash transfers in (from others) and any new loans requested and approved.

By comparing the cash available and cash requirements for next cycle, the amount of cash surplus or deficit and the amount of loan needed can be estimated.

It is possible, of course, to request a new loan at any point, even if the firm has a cash surplus. Any loans requested will automatically be granted at the beginning of each cycle, as long as the total of all new loans requested does not exceed the maximum loan possible. This limit is on the printout under the "CASH IN-CASH OUT STATEMENT", Section VII - D. The maximum new loan possible is related to net worth and existing indebtedness. The credit rating for each year will be indicated in this same section of the printout. The interest rate depends on the firm's credit rating and on the number of years taken to repay the loan. The maximum number of years for a loan is 20. The following chart (from the Glossary, Chapter 2) indicates how interest rates will vary:

	Credit Rating		
Years to Repay	A-1	A-2	A-3
1-2	4%	6%	8%
3-5	6%	8%	12%
5-10	8%	12%	16%
11-20	12%	16%	20%

Failure to meet loan payments lowers the firm's credit rating. When a new loan is approved, the loan and appropriate interest rate is recorded on the printout under "OUTSTANDING DEBITS", (B).

Instructions: From the printout in the "CASH IN-CASH OUT STATEMENT" (VI), find the cash available and add 5 percent interest to it. Then add to this any income anticipated from cash transfers to get the total cash on hand. Subtract from this all initial cash requirements which are as follows: (1) cash transfers (to other players), (2) loan payments currently due, (3) property taxes, (4) capital expenditures, and (5) campaign contributions. Determine if any new loans need to be requested.

Example:

Loan Requirement Estimation

1. Cash on Hand

Cash Available for Next Cycle		$ 250,000	
5% Interest on Cash Available	x	.05	
		$ 12,500	
Cash Transfers from Others		$ 5,200	
Total Cash On Hand			$ 267,700

2. Estimated Cash Requirements (Beginning of Cycle)

Cash Transfers to Others	$ 800	
Loan Payments	$ 202,020	
Property Taxes	$ 14,025	
Estimated Capital Expenditures	$ 278,000	
Campaign Contributions	$ 7,000	
Total Cash Requirements (Beginning of Cycle)		- $ 501,845
Cash Surplus or Deficit		$ 234,145 (deficit)

Current Credit Rating _A-2

Maximum New Loan Possible $2,096,240

The loan request decided upon will then be entered under "CASH IN ESTIMATE", Part IV-C in the Worksheet (see below).

IV. CASH IN ESTIMATE

The total cash in can be estimated by adding cash available for next cycle, total estimated income and new loans requested.

Instructions: In the worksheet, Section IV, "Cash In Estimate" enter the cash available for next cycle from Section VI of the printout; total estimated income from Section III of the worksheet and the new loans requested based on the loan requirement estimation section of the worksheet; add to determine the Estimated Cash In for next cycle.

Example:

IV. Cash In Estimate

A. Cash Available for Next Cycle	$ 250,000	
B. Total Estimated Income	$10,291,950	

C. New Loans Requested

Years for Repayment	Percent Interest	Loan Amount
2	6%	$300,000

Total New Loans Requested	$ 300,000	
Total Cash In Estimated		$10,841,950

V. CASH OUT ESTIMATE

V. CASH OUT ESTIMATE

The total cash requirements or cash out estimate for next cycle is the sum of operating costs, income taxes, capital expenditures and dividend payments. Operating costs, income taxes and capital expenditures have already been calculated in the worksheet and these totals need only be brought forward and entered under V-A, B and C below.

The estimated dividend must be determined by negotiation with the Board of Directors (Role Advisor). It is one of the duties of your Board of Directors to review the Profit and Income Tax Estimations and Cash Flow Requirements to determine what proportion of the net profit should be paid to stockholders in the form of dividends, what amount should be used to decrease indebtedness, what amount should be reinvested in the corporation, etc. As Plant Manager, the Industrialist can recommend the amount that should be taken out in dividends, but he should also include an explanation of the strategies and goals for the overall plant operations. All such recommendations will be considered by the Board of Directors as they make their decisions.

Instructions: From the worksheet estimates of "Operating Costs" (Section II), estimated "Income Taxes" (Section III) and total "Capital Expenditures", fill in Items A, B and C under V - Cash Out Estimate. Estimate dividend payments, write justification for dividend to Board of Directors and get agreement with Board on dividend to be paid. Enter dividend in V-C - Cash Out Estimate to determine Cash Available for Following Cycle.

Example:

V. Cash Out Estimate

A.	Total Estimated Operating Costs	$7,715,100	
B.	Total Estimated Taxes	$1,211,018	
C.	Total Capital Expenditures	$ 278,000	
D.	Estimated Dividend Payment (see below)	$ 204,000	
	Total Cash Out Estimate		$9,408,118
	Cash Available for Following Cycle		$1,663,625

Plant Manager Recommendation on Dividends to Board of Directors: $ 200,000

Reason for Recommendation: Estimated cash requirements for next cycle were $501,845. In addition a new loan was taken out which will require repayment of about $150,000 per year plus 6% interest of about $18,000. It is estimated that EQA pressures will require additional capital expenditures for pollution control equipment in the amount of at least $1,197,000. Therefore, cash available of $1,867,625 barely meets these requirements for the following cycle. Request dividends this year be reduced to $200,000 to cover this approaching cash shortage.

Actual Dividends to be Paid $ 204,000

Board of Directors Signature: ____________________

VI. NEWS RELEASE

Each cycle you should report your activities to the community. This is accomplished partially be developing a news release for the News Media.

Instructions: Develop a news release or publication. Present the news release to the representative of the News Media.

Example:

Industrialist's News Release

Dusty Rhodes Cement Plant Manager announced today that his company is planning an investment of over $1,800,000 to expand its plant to substantially increase employment opportunities for unemployed workers in the Central City.

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CHAPTER 5

Worksheet

ELITE OPINION POLL

Role________________ Cycle Number________

Issue No.	Alternative

Industrialist Number_____ Cycle Number_____

INCOME AND OPERATING COST ESTIMATES

I. ESTIMATED INCOME — TOTALS

A. Interest on Cash Available

1. Cash Available for Next Cycle $__________
2. Interest Rate (5%) x __________.05
3. Total Interest on Cash $__________

B. Product Sales

1. Sales Price ($ per unit) $__________*
2. Estimated Sales (units) x __________*
3. Total Income from Sales ($) $__________
4. Estimated Sales (units) __________
5. Desired Inventory Carryover (units) + __________
6. Total Units Needed __________
7. Inventory on Hand (units) (Production Information) - __________
8. Estimated Production Level (units) __________*
9. Maximum Production Capacity - __________
10. Desired Increase in Maximum Production Capacity __________

C. Cash Transfers (from other players)

From Player	Transfer Amount	Reason

Total Cash Transfers (from other players) $__________

Industrialist

TOTALS

D. Land Sales (to market or other players)

AA*	Vac/Dev.*	Zone Cat.*	Buyer*	No. of Units*	(or) No. of Acres*	Price/Acre* Price/Unit*	Total Price

Total Income from Land Sales $ ________

E. Estimated Return from Exofirm Investments

Exofirm No.	Amount Invest	A.A. No.	Exofirm Name	Estimated Return

Total Estimated Return on Exofirm Investments $ ________

TOTAL ESTIMATED INCOME (sum of I-A thru I-E) $ ________

II. ESTIMATED OPERATING COSTS

A. Labor Costs

1. Estimated Production Level ________
2. Employment/Production Ratio x ________
3. Number of Employees ________
4. Average Annual Wage x $ ________*
5. Total Labor Costs $ ________

Industrialist

TOTALS

B. Materials Costs

1. Estimated Production Level ____________
2. Material Costs/Product Unit x $ ____________
3. Total Material Costs $ ____________

C. Fuel Costs

1. Fuel Type Selected ____________ *
2. Estimated Production Level ____________
3. Fuel Cost/Product Unit x $ ____________
4. Total Fuel Costs $ ____________

D. General Administration Costs

1. Estimated Production Level ____________
2. General Administration Cost/Product Unit x $ ____________
3. Total Administration Costs $ ____________

E. Inventory Carrying Costs

1. Desired Inventory Carryover ____________
2. Inventory Carrying Cost/Product Unit x $ ____________
3. Total Inventory Carrying Cost $ ____________

F. Air Pollution Controls Operation Costs

Production Sub-Process No.*	Control No.*	Control Name	Estimated Production Level/Units	Per Unit Operating Cost	Annual Operating Cost

Total Air Pollution Control Operating Costs $ ____________

Industrialist

TOTALS

G. Plant Maintenance Cost $ ______ *

H. Consultant Cost - Air Pollution Emission Data $ ______ *

I. Consultant Cost - Pollution Control Systems

1. Air Pollution Control System Data $ ______ *

2. Water Pollution Control Equipment Data + $ ______ *

Total Control System/Equipment Data Costs $ ______

J. Loan Payments

Loan Number*	Payment Amount*

Total Loan Payments $ ______

K. Property Taxes

Jurisdiction*	Payment Amount*

Total Property Tax Costs $ ______

L. Cash Transfers (to other players)

To Player*	Reason	Transfer Amount*

Total Cash Transfers to Others $ ______

Industrialist

TOTALS

M. Campaign Contributions

Pol/Bond/Mill No.*	For	Against	Contribution Amount*

Total Campaign Contribution Costs $ ________

N. Zoning Application Fee/Demolition Costs

Zoning Applications

A.A.	Vac/ Dev.	From	To	No. of Units	(or) No. of Acres	Fee
						$100
						$100
						$100
						$100

Total Zoning Application Fees $ ________

Demolition Costs

1. Value of Developed Land Being Rezoned $ ________
2. Rate of Demolition Costs x .05

Total Demolition Costs $ ________

Total Zoning and Demolition Costs $ ________

O. Water Pollution Effluent Data - Consultant Costs $ ________ *

P. Water Pollution Control Equipment Operating Costs

Control No.*	Control Name	Estimated Production Level/Units	Per Unit Operating Cost	Annual Operating Cost

Total Water Pollution Control Operating Costs $ ________

Industrialist

TOTALS

Q. Cost of Purchasing Water (Estimate)

1. Estimated Production Level (units) ________
2. Water Volume per Unit Production x ________
3. Estimated Water Use (1000 gals.) ________
4. Water Cost per 1000 Gals. x $ ________
5. Total Cost of Purchasing Water $ ________

R. Cost of Municipal Sewage Treatment

1. Estimated Production Level (units) ________
2. Effluent Volume per Unit Production x ________
3. Estimated Effluent Volume (1000 gals.) ________
4. Sewage Treatment Cost per 1000 Gals. x $ ________
5. Total Cost of Sewage Treatment $ ________

S. Cost of Removing Solid Waste

1. Solid Waste Generated-Industrial Process (tons) ________
2. Solid Waste Recovery-Air Pollution Controls (tons) + ________
3. Solid Waste Recovery-Water Poll. Controls (tons) + ________
4. Total Solid Waste Generated (tons) ________
5. Solid Waste Removal Cost per Ton x $ ________
6. Total Cost of Removing Solid Waste $ ________

Industrialist

TOTALS

T. Investment in Exofirms

Exofirm No.*	Preferred Location	Exofirm Name	Amount Invested*

Total Investment in Exofirms $ ________

TOTAL ESTIMATED OPERATING COSTS (Sum of II-A through II-T) $ ________

III. PROFIT AND INCOME TAX ESTIMATES

A. Gross Profit Estimate

1. Total Estimated Income $ ________
2. Total Estimated Operating Costs - $ ________
3. Estimated Gross Profit $ ________

B. Tax Depreciation Allowance

1. Maximum Tax Depreciation Allowance $ ________
2. Desired Tax Depreciation Allowance - $ ________

C. Total Taxable Income $ ________

D. Federal and State Income Taxes

1. Total Taxable Income $ ________
2. Federal and State Income Tax (55%) x ________ .55
3. Total Estimated Taxes $ ________

Industrialist

TOTALS

E. Estimated Net Profit

1. Estimated Gross Profit $ ______
2. Total Estimated Taxes $ ______

Total Estimated Net Profit $ ______

CAPITAL EXPENDITURES ESTIMATE

Plant Expansion--Increase Maximum Capacity

A. Desired Increase in Maximum Production Capacity ______

1. Minimum Production Expansion Increment ______
2. Number of Minimum Increments Required ______

B. Equipment Expansion Costs

1. Minimum Equipment Increment Cost $ ______
2. Number of Increments Required x ______
3. Total Equipment Expansion Cost $ ______ *

C. Building Expansion Cost

1. Minimum Building Increment Cost $ ______
2. Number of Increments Required x ______
3. Total Building Expansion Cost $ ______ *

D. Land Purchase Cost

1. Minimum Land Increment ______
2. Number of Increments Required x ______
3. Land Required for Plant Expansion (acres) ______

Industrialist

TOTALS

4. Summary of Land Purchases and Costs

Seller*	AA*	Vac/ Dev.*	Zone Cat.*	No. of Units*	(or) No. of Acres*	Price/Acre* Price/Unit*	Total Price

Total Cost of Land Purchases $ ________

E. Pollution Control Equipment Purchase Cost

1. Air Pollution Control Equipment Cost

Production* Sub-Process No.	Control No.*	Control Name	Initial Investment Cost*

Total Air Pollution Control Equipment Costs $ ________

2. Water Pollution Control Equipment Cost

Control No.*	System Name	Initial Investment Cost*

Total Water Pollution Control Equipment Costs $ ________

TOTAL CAPITAL EXPENDITURES
(Sum of A through E) $ ________

Industrialist

TOTALS

CASH IN-CASH OUT ESTIMATES (CASH FLOW)

Loan Requirement Estimation

1. Cash on Hand

Cash Available for Next Cycle $ ________

5% Interest on Cash Available x ________ .05

$ ________

Cash Transfers from Others $ ________

Total Cash on Hand $ ________

2. Estimated Cash Requirements

Cash Transfers to Others $ ________

Loan Payments $ ________

Property Taxes $ ________

Estimated Capital Expenditures $ ________

Campaign Contributions $ ________

Total Cash Requirements - $ ________

Cash Surplus or Deficit $ ________

Current Credit Rating ____

Maximum New Loan Possible $ ________

IV. CASH IN ESTIMATE

A. Cash Available for Next Cycle $ ________

B. Total Estimated Income $ ________

Industrialist

TOTALS

C. New Loans Requested

Years for Repayment*	Percent Interest*	Loan Amount*

Total New Loans Requested $________

Total Cash In Estimate $________

V. CASH OUT ESTIMATE

A. Total Estimated Operating Costs $________

B. Total Estimated Income Taxes $________

C. Total Capital Expenditures $________

D. Estimated Dividend Payment (see below) $________

Total Cash Out Estimate - $________

CASH AVAILABLE FOR FOLLOWING CYCLE $________

> Note: Reconsider loan requests, dividend recommendations for price-production levels if cash available not adequate.

Plant Manager Recommendation on Dividends to Board of Directors: $________

Reason for Recommendation: ________

Actual Dividends to be Paid $________*

Board of Director's Signature ________

Industrialist

THIS SPACE FOR ROLE ADVISOR USE ONLY

Cycle No. ________ ______________________________
(Name of the submitting role)

NEWS RELEASE

The following is submitted to the
News Media for possible publication.

Editors Recommendation: PRINT ________ TELEVISE ________
INVESTIGATE FURTHER OR REWRITE ________

……

Cycle No. ________ ______________________________
(Name of the submitting role)

NEWS RELEASE

The following is submitted to the
News Media for possible publication.

Editors Recommendation: PRINT ________ TELEVISE ________
INVESTIGATE FURTHER OR REWRITE ________

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CHAPTER 6

Background Information

Chapter 6

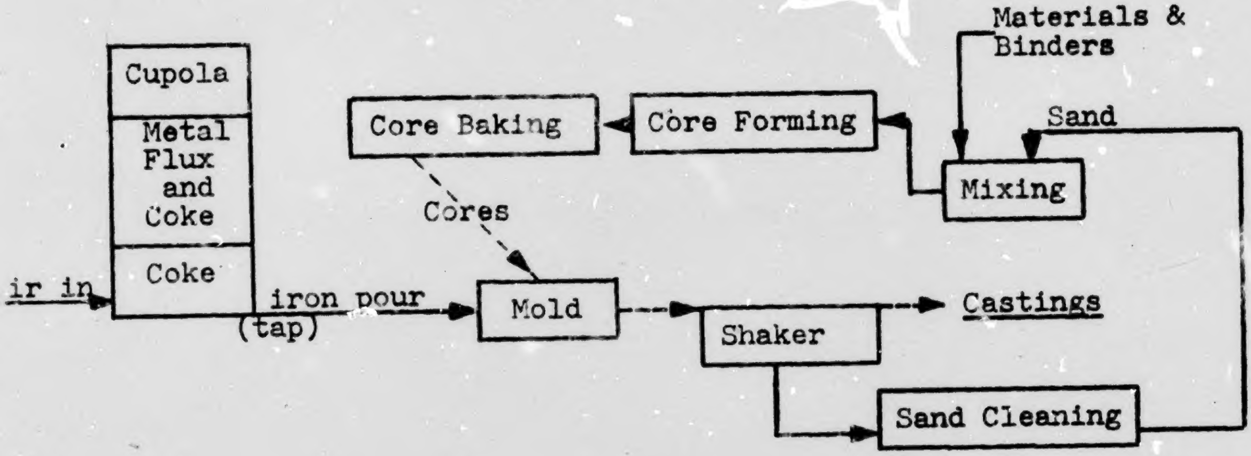
BACKGROUND INFORMATION FOR INDUSTRY NO. 3
RUSTY'S IRON FOUNDRY

1. Description of Firm

Rusty's Iron Foundry was established in 1942. The firm produces iron castings. Metal, flux and coke are placed in refractory lined cupolas and the coke is burned by forcing combustion air into the cupolas. The molten iron flows out of a taphole in the bottom of the cupolas and is poured into molds containing sand cores. Cores are used to form desired cavities in the castings and must be firm enough to allow the molten iron to flow around them without breaking shrinking or warping. Cores are made by mixing sand with "binders", and then baking the shaped core in a core baking oven to melt the binders and produce a smooth firm shape.

After a poured casting has solidified the molds are shaken to loosen and remove the sand from the casting. The sand is then cleaned and reconditioned for reuse.

Simplified Foundry Process Schematic


Materials &
Binders
Cupola
Metal
Flux
and
Coke
Coke
Core Baking
Core Forming
Sand
Mixing
Cores
ir in
iron pour
(tap)
Mold
Shaker
Castings
Sand Cleaning

Last year the plant produced a total of 12,500 tons of iron castings and sold 13,000 tons for a gross revenue of $5,200,000. The difference between annual production and sales came from inventories carried over from the preceding year. The plant employed 63 people at an average yearly wage rate of $7,800.

The plant occupies a 1.3 acre site in analysis area 5. No furthe company-owned land is available at the present site for plant expansion. Current land is appraised at a market value of $64,999; buildings at $450,000 and equipment at $300,000.

Equipment and buildings have been found to decrease in productive capacity at a rate of 8% per year due to wear and aging. They must be maintained by repair and replacement each year or the plant's productive capacity will permanently decline the following year. A maintenance expenditure of $60,000 is required this year to maintain present productive capacity. For later years, additional maintenance costs will arise as building and equipment are expanded.

Rusty's Iron Foundry can produce a maximum of 52 tons of iron castings per day with its existing equipment. The following are the firm's major processes.

No.	Process Type	Hours Per Day	Materials Per Hour
1.	Two Cupolas*	4	6.4 tons (each)
2.	Sand Handling	8	32 tons
3.	Core Baking	8	0.6 tons

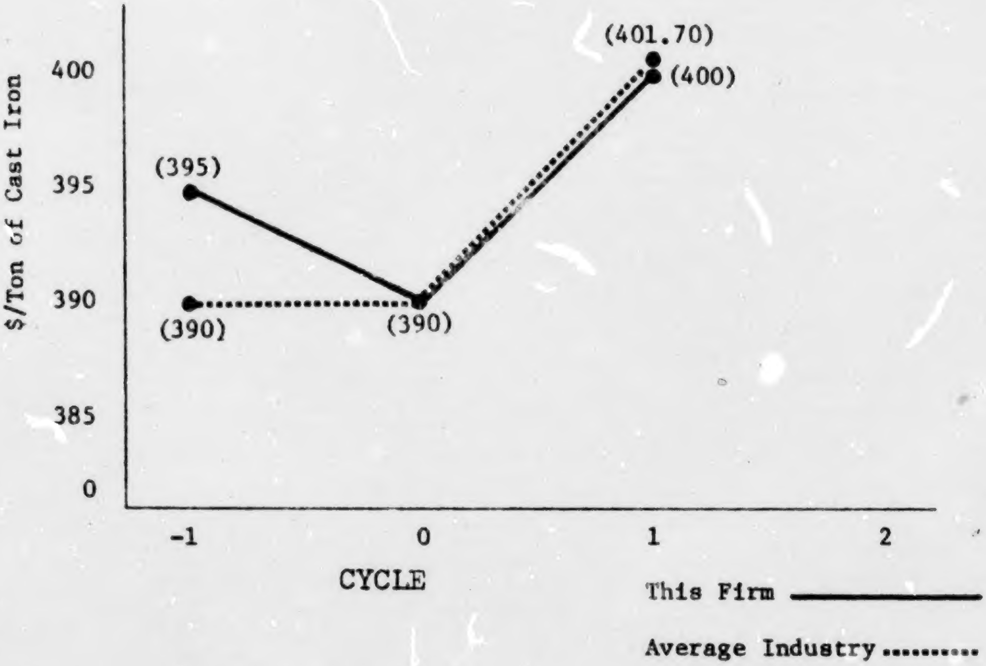
*No combustion processes and pollutants are attributed to cupolas. However, cupolas do use one ton of low grade coke per ton of metal. This low grade fuel costs $7.00 per ton and has a sulfur content of 4.4% and an ash content of 10.0%; it will be reported as Lo Coal.

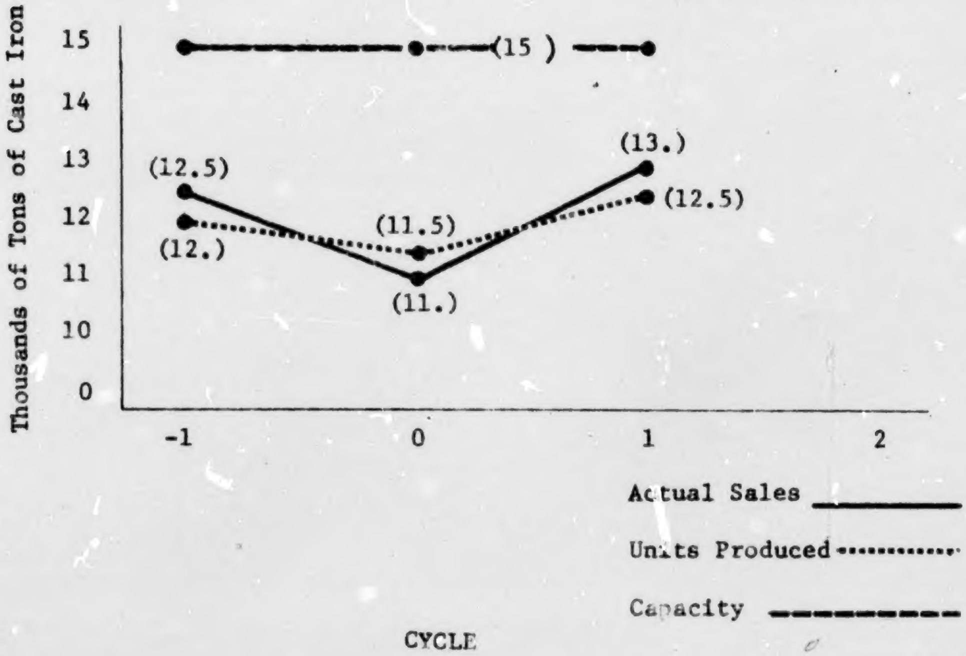
2. Price - Production Record

The graphs below show the past record of the firm in terms of unit price charged, production level, sales, and inventory carryover. The top graph describes the price record for this firm in relation to price levels for the entire industry. The bottom graph indicates how much of the firm's sales came from current production and how much from inventory carryover for the past three years. Computer printout each cycle will report on production, sales, and inventory carryover for the most recent three years.

PRODUCTION PRICE RECORD

RUSTY'S IRON FOUNDRY





3. Key Production Relationships and Minimum Expansion Increments

$$\frac{\text{Employment}}{\text{Production Level}} = 0.005 \text{ Employees per Ton Production}$$

$$\frac{\text{Equipment Value}}{\text{Production Capacity}} = \$20.00 \text{ per Ton Capacity}$$

$$\frac{\text{Building Area}}{\text{Equipment Value}} = 0.15 \text{ sq. ft. Building Area per \$ Equipment Value}$$

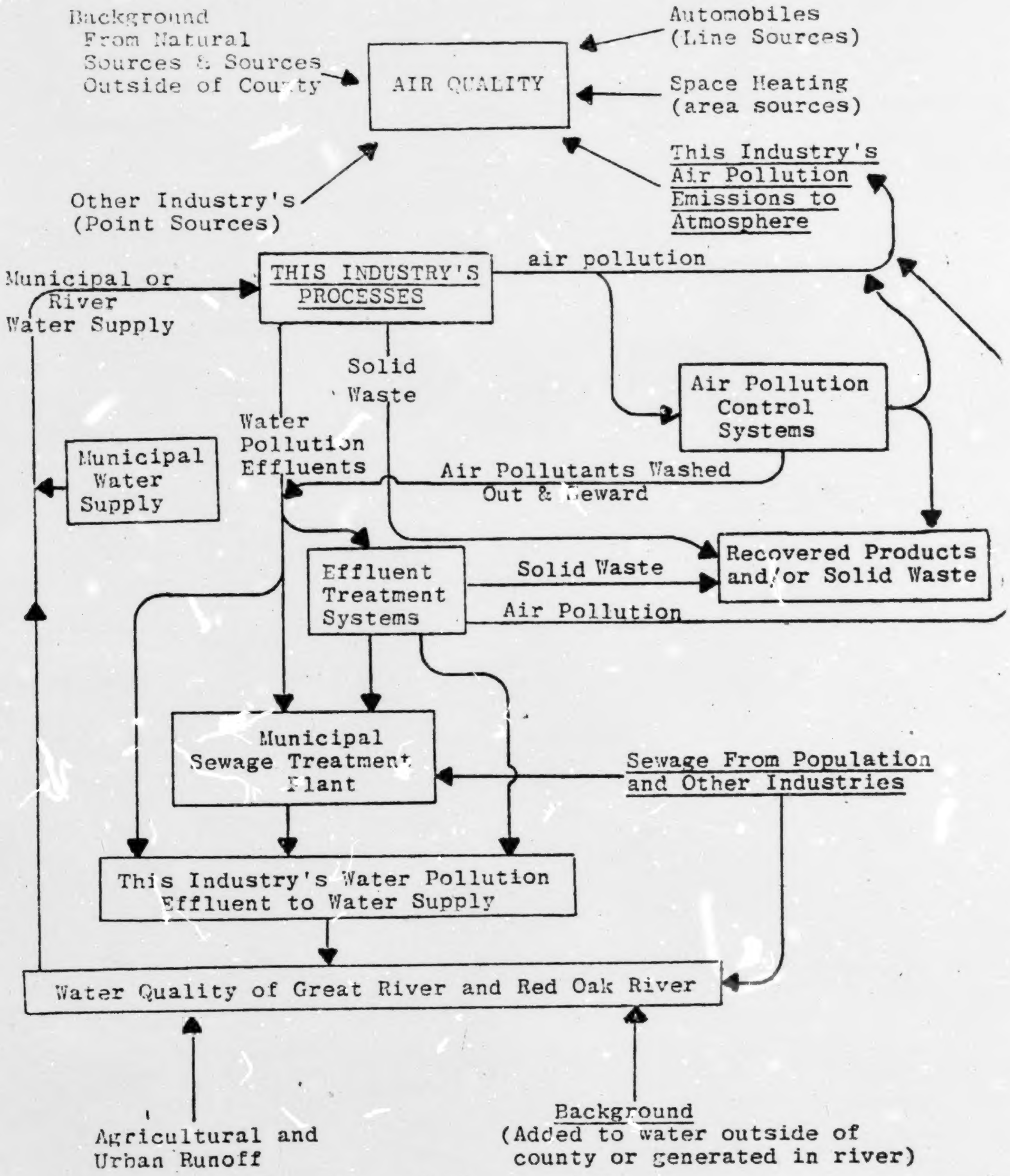
$$\frac{\text{Land Area}}{\text{Building Area}} = 0.000029 \text{ Acres of Land per sq. ft. Building Area}$$

Minimum Prod. Capacity Increment = 3,000 Tons Capacity
Minimum Equipment Increment = $60,000
Minimum Building Increment = $90,000 (9,000 sq. ft.)
Minimum Land Increment = 0.26 Acres (zoned vacant ind

4. Pollution Generation and Controls

The pollution generation potential and pollution control options for a typical industry in APEX County are shown in the following schematic. With uncontrolled production processes, most industries generate some air and water pollution and solid waste. The schematic, however, shows that there is an interrelation between air and water pollution and solid waste. The installation of pollution control systems may produce solid waste products or water pollution effluents; likewise, water effluent treatment systems may produce sol waste and air pollution.

POLLUTION GENERATION AND CONTROLS


Background From Natural Sources & Sources Outside of County
AIR QUALITY
Automobiles (Line Sources)
Space Heating (area sources)
This Industry's Air Pollution Emissions to Atmosphere
Other Industry's (Point Sources)
Municipal or River Water Supply
THIS INDUSTRY'S PROCESSES
air pollution
Solid Waste
Air Pollution Control Systems
Water Pollution Effluents
Municipal Water Supply
Air Pollutants Washed Out & Leeward
Recovered Products and/or Solid Waste
Effluent Treatment Systems
Solid Waste
Air Pollution
Municipal Sewage Treatment Plant
Sewage From Population and Other Industries
This Industry's Water Pollution Effluent to Water Supply
Water Quality of Great River and Red Oak River
Agricultural and Urban Runoff
Background (Added to water outside of county or generated in river)

5. Air Pollution Potential

This firm has three processes with air pollution potential. These are:

Process No. And Type	Air Pollution Potential
1. Two Cupolas*	Part., SO_2, CO
2. Sand Handling	Part.
3. Core Baking	Smoke, Odor

The rate at which the firm's process produces the air pollutants can be determined by hiring a consultant for $5000 to provide Air Pollution Emission Data (Section II-H in the Worksheet). A rough estimate of the firms air pollution emissions can be calculated by using emission factors (see Figure 1 and 2) which are industry averages for emissions from combustion and production processes.

a. Emission Factors - (Air Pollution Emission Estimates)

Emission factors are used to make a very rough estimate of the pollution emitted from an uncontrolled air pollution source. (The following emission data set has been specifically adapted to the METRO-APEX exercise and should not be used for reference except in the exercise.)

The emission rate for a production process may be estimated by multiplying the production rate by the emission factor for the appropriate type of industry. For example, if a Pulp Plant produces 300 units of product per day, an estimate of particulate emission can be determined. Example: Published data (Figure 1) on Emission Factor for Particulate Emissions from a pulp plant:

Emission Factor = 14-16 lbs/hr per unit of production per day

For example, if a pulp plants current production rate is 87000 units/year and the plant is operating 286 days per year (all plants in APEX County operate 286 days per year except Shear Power Company which operates 365 days per year):

$$\text{Production Rate} = \frac{87000\ \text{units/year}}{286\ \text{days/year}} = 304\ \text{units of production/day}$$

$$\text{Estimated Particulate Emissions} = \left(\frac{304\ \text{units}}{\text{day}}\right) \times \left(\frac{14\ \text{lbs/hr}}{\text{unit/day}}\right) = 4256\ \text{lbs/hr}$$

The emission rate for a combustion process can be estimated by multiplying the emission factor for the appropriate fuel type by the fuel/production ratio, and by the production rate (converted to units produced by hour). Example: Published data (Figure 2) on Particulate Emissions for Low Grade Coal Combustion:

Emission Factor = 200-230 lbs/ton coal

From the Fuel Table, Section 1 of this Chapter, an industry finds that he consumes .7 ton of coal/unit of production.

$$\text{Fuel Per Unit Production} = \frac{.7\text{ tons low grade coal}}{\text{unit production}}$$

(Note: this fuel rate varies from industry to industry and may be different for your industry then in this example.)

The Production Rate (calculated above) = 304 units/day.

The hours per day of combustion (from the Production Process Table in Section 1 of this Chapter) = 24 hours/day.

Then an estimate of emission from combustion can be calculated:

$$\left(\frac{200\text{ lbs of Part.}}{\text{ton of low coal}}\right)\text{x}\left(\frac{.7\text{ tons of low coal}}{\text{unit production}}\right)\text{x}\left(\frac{304\text{ units/day}}{24\text{ hours/day}}\right)=1773.\text{ lbs/hr of Part.}$$

b. Control Efficiency - (Estimates of Air Pollution Control System Effects)

The air pollution control systems that are available to reduce air pollution emissions and the costs and control efficiency of the systems can be determined by ordering a $5000 consultant study to provide "Air Pollution Control System Data" (Section II-I,1 in the Worksheet.) For example, an industry ordered an "Air Pollution Emission Data" consultant study and found that its production process No. 2 has a particulate emission rate of 3000 lbs per hour. The industry also ordered an "Air Pollution Control System Data" consultant study and found that purchase and operation of an "Electrostatic Precipitator and Venturi Scrubber" would reduce particulate emission by 99 percent. The emission rate for particulate from Process No. 2 with that air pollution control installed can then be calculated:

Particulate Removed by Control =
(3000 lbs/hr) x (.99) = 2970 lbs/hr.

Particulate Emission with Control =
(3000 lbs/hr) - (2970 lbs/hr) = 30 lbs/hr

If the air pollution control system is purchased and operated, the exact emission reduction will be reflected in the industry's air pollution emission data in the printout. (Note: For any particular process, there may be one available control. more than one control system, or no control systems available.)

6. Water Use and Water Pollution Potential

The industry's operation requires the use of process and utility water. If the firms intake water is from the river, the Plant Manager may be interested in the pollution level of the river. Extreme river pollution may make the intake water unsuitable for use or require costly treatment prior to use. If the industry is using water drawn from the municipal supply it will incur a water use cost depending upon the current municipal water charge in $ per 1000 gallons. Extreme river pollution may cause the municipal water price to increas due to costly pretreatment.

Current water cost (set by the Politicians) per 1,000 gallons used is listed in the printout under "COST FACTORS", Item O. This cost is set by the Politicians of the jurisdiction from which the water is drawn. To estimate the water use and costs for a given production level, see "Cost of Purchasing Water (Estimate)" in Section II-Q of its worksheet.

The industry's water usage in 1,000 of gallons per product unit and the source of the water is in the following table. The total cost of purchasing water for last cycle can be found in the printout under Section II, "OPERATING COSTS", Item Q. If the industry is drawing water from the river, Item Q will indicate zero cost.

The water used by the industry picks up contaminants during use and this polluted water is disposed of by dumping into the river or public sewage system. The water effluent from each industry has the following water pollution potential:

Industry	Initial Water Use 1000 Gals/Unit	Water Effluent 1000 Gals/Prod Unit	Potential Water Effluent Pollution Type
1. Shear	24	23	Temp., D.O.
2. Pulp	70	64	Temp., D.O., B.O.D., Nutrients, T.D.S.
3. Foundry	0.080	0.050	Temp., D.O., T.D.S.
4. Brewery	0.700	0.612	Temp., D.O., B.O.D. Nutrients, T.D.S.

con't. next page

Industry	Initial Water Use 1000 Gals/ Unit	Water Effluent 1000 Gals/Prod Unit	Potential Water Effluent Pollution Type
5. Rendering	0.300	0.490	Temp., D.O., B.O.D. Nutrients, T.D.S. Coliform
6. Cement	0.015	0.005	Temp., D.O.
7. Cannery	0.070	0.054	Temp., D.O., B.O.D. Nutrients, T.D.S.

Sources:

Industry	Source of Water
1. Shear	River
2. Pulp	River
3. Foundry	Central City
4. Brewery	Central City
5. Rendering	Central City
6. Cement	County
7. Cannery	Central City

If the industry is connected to the municipal sewage treatment plant, the sewage treatment cost (set by the Politicians) per 1000 gallons of water effluent is listed in the printout under "COST FACTOR Item P, and the total cost of sewage treatment for last cycle is in the printout under Section II, "OPERATING COSTS", Item R. If the industry is dumping its water effluent into the river, Item R cost will be zero.

To estimate the total effluent volume and sewage treatment plant costs for a given level of production, see "Cost of Municipal Sewage Treatment" in Section II-R of the worksheet.

a. Water Effluent Data - Effluent Pollution Levels

Information on an industry's water effluent can be obtained by purchasing a "Water Effluent Data" consultant study for $5000 (See Section II-O in the worksheet). This information includes effluent volume in gallons per production unit, effluent temperature, and the concentration of the five potential water pollutants, disolved oxygen, biological oxygen demand, nutrients, total disolved solids and coliform bacteria.

The water effluent volume and pollutant concentrations are primarily a result of the firms production processes. However, changes in effluent volume and pollutant concentrations may occur if an industry installs air pollution control equipment (such as a water scrubber) which uses additional water to collect air pollutants which then become part of its water effluent.

b. Water Pollution Control Systems - Estimated Water Pollution Control System Effects

Information on the water pollution control systems which are available to reduce the concentration of water pollutants in the industry's water effluent can be obtained by purchasing a "Water Pollution Control Equipment Data" consultant study for $5,000 (see Section II-I,2 in the worksheet).

From the "Water Pollution Control Equipment Data" and the "Water Effluent Data" (see "a." above) an estimate of the concentration of a water pollutant in the industry's effluent, with the control system operating, can be calculated. Example: the purchased "Water Effluent Data" for an industry shows that (in addition to other water pollutants):

Nutrients in Effluent = 43 milligrams/liter (mg/l)

The purchased "Water Pollution Control Equipment Data" for that industry, for example, shows that a Settling Lagoon is available as one of the water pollution control systems and that the Lagoon reduces nutrient concentration in the effluent by 50%.

If this Lagoon is purchased and operated, the nutrients in the effluent of industry will be:

Controlled Effluent-Nutrient Concentration = (43 mg/l) x (.5) = 21.5 mg/l

(Note: For any particular water effluent pollutant there may be one available control system, more than one available control system or no available control system.)

7. Solid Waste Generation

The total solid waste generated by an industry is the sum of the solid waste from industrial processes, solid waste recovered from operating air pollution control systems and solid waste recovered from operating water pollution control equipment.

a. Industrial Processes

The solid waste that will be generated from production process for a cycle is proportional to the production level, i.e., units produced. Using last cycles "SOLID WASTE GENERATED FROM INDUSTRIAL PROCESSES" (printout, "COST FACTORS"), last cycle Production Level (printout, Production Information), and this cycles estimated production level (worksheet, Section I-B,8):

Example:

Industrial Solid Waste Last Cycle = 4,000 tons
Production Level Last Cycle = 12,500 units
Production Level This Cycle = 14,000 units

Estimated Industrial Solid Waste This Cycle =

$$\text{Industrial S.W. Last Cycle} \quad x \quad \frac{\text{Production Level This Cycle}}{\text{Production Level Last Cycle}}$$

Estimated Industrial Solid Waste This Cycle =

$$4{,}000 \quad x \; \frac{14{,}000}{12{,}500} = 4480 \text{ tons}$$

b. Recovery from Air Pollution Control Systems

If an Industrialist purchases and operates air pollution control equipment on one or more of his production processes, he may recover some solid waste products from the controls operation. For instance, if an industry were to install a Water Scrubber on his industrial process No. 2, he might expect to recover some dust or particulate from the collectors which would be "solid waste"; he would then need to dispose of this solid waste cycle by cycle as long as the controls were operated.

Example--an industry orders a consultant study on Air Pollution Emission Data for $5,000 and the study data in his next cycle printout shows for industrial process No. 2 the following:

Emission Rate, Particulates = 140 lbs/hr

His particulate emission is 140 lbs per hour at his current production level of 12,500 units per year. His plant is operating 286 days per year and his process No. 2 operation (from 'Process Information') averages 8 hours per day. His yearly uncontrolled particulate emission from process No. 2 is therefore:

140 lbs/hr x 8 hrs/day x 286 days/year = 320,320 lbs/year

The Industrialist also orders a consultant study on Air Pollution Control Systems for $5,000 and his printout data shows for Process No. 2:

Process	Name	Control No.	System Name
2	Recovery	12	Water Scrubber

Control Efficiency, Particulate = 84%

The control efficiency on particulate is 84%. If he purchases and operates this piece of control equipment, he will recover 84% of his current particulate emission from process No. 2. Example:

Particulate Recovered = 0.84 x 320,320 lbs/year = 269,069 lbs/year

He is, therefore, generating 269,069 lbs or $\frac{269,069}{2,000}$ = 134.5 tons/year of solid waste from the air pollution control system on this process at his current production rate of 12,500 units per year.

C. Recovery from Water Pollution Control

If the Industrialist orders a consultant study for $5,000 to determine his current water pollution effluent data he might, for example, get the following data in his printout:

Effluent Volume = 50 gallons/unit

Total Disolved Solids Concentration = 3760 mg/l

At the current production rate of 12,500 units/year and 286 days of operation per year:

Effluent Volume = 50 gal/unit x 12,500 units = 625,000 gals/yr

The total disolved solids content of this industries effluent is 3760 milligrams/liter:

3760 milligrams/liter x .0000083 = .0312 lbs/gal

(Note: multiply milligram per liter by .0000083 to get lbs/gal)

The total effluent volume times the total disolved solids per gallon = lbs of solids per year in the industry's effluent:

625,000 gal/yr x .0312 lbs/gal = 19,500 lbs/year

If the Industrialist orders a consultant study on Water Pollution Control Equipment Data for $5,000 and the information he gets on his printout includes:

System Name: Sedimentation
Percent Reduction in Total Disolved Solids = 50%

The study indicates that this industry's total disolved solids would be reduced by 50% by Sedimentation. If this control is purchased and operated, the solid wastes generated can be estimated by:

Effluent Total Disolved Solids = 19,500 lbs/year

Control Reduction at 50% = 19,500 x .5 = 9,750 lbs/year

or

$\frac{9750}{2000}$ = 4.875 tons/year of solids recovered as waste at his current production level of 12,500 units per year.

d. Total Solid Waste Estimate

The total solid waste estimated for next cycle with an increase of production from 12,500 units to 14,000 units and with both the air pollution control system and water pollution control equipment installed and operating is:

(a) From Production

$$4000 \times \frac{14,000}{12,500} = 4,480 \text{ tons}$$

(b) From Air Pollution Control

$$134.5 \times \frac{14,000}{12,500} = 150.6 \text{ tons}$$

(c) From Water Pollution Control

$$4.9 \times \frac{14,000}{12,500} = 5.5 \text{ tons}$$

Total Est. Solid Waste 4,636.1 tons

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CHAPTER 7

References

Chapter 7

REFERENCES FOR INDUSTRIALIST'S ROLE

Air Pollution Aspects of Emission Sources, Bibliography with Abstracts, U.S. Environmental Protection Agency, Air Pollution Technical Information Center, EPA Research Triangle Park, N.C. 27711.

a.	Pulp and Paper Industry	AP-121
b.	Boilers	AP-105
c.	Iron and Steel Mills	AP-107
d.	Petroleum Industry	AP-110
e.	Primary Copper Production	AP-125
f.	Primary Lead Production	AP-126
g.	Primary Aluminum Production	AP-119
h.	Sulfuric Acid Manufacture	AP-94
i.	Electric Power Production	AP-96
j.	Nitric Acid Manufacture	AP-93
k.	Municipal Incinerator	AP-92
l.	Cement Manufacturing	AP-95

Air Pollution Engineering Manual, Second Edition, John A. Danielson, Air Pollution Control District, County of Los Angeles, Published by the Environmental Protection Agency, Office of Air and Water Pollution Programs, Research Triangle Park, North Carolina 27711, May 1973.

The Brewing Industry in the United States, Brewers Almanac, 1970, Published by the U.S. Brewers Association, Inc.

The Canning Industry, Information Division, National Canners Assoc.

The Chemical Process Industries, R. Norris Shreve, 1956, McGraw-Hill.

A Citizen's Guide to Clean Air, January 1973, The Conservation Foundation.

A Citizen's Guide to Clean Water, Isaak Walton League of America, 1973.

Compilation of Air Pollution Emission Factors, Second Edition, EPA, Research Triangle Park, N.C., 1973, AP-42.

Industrial Pollution Control Handbook, Herbert F. Lund, Editor-In-Chief, 1971, McGraw-Hill.

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CHAPTER 8

Annotated Printout

The following pages represent the annotated printout for the Industrialist. The decisions are representative of the types of decisions that the Industrialist could make. Some of the rationale for making these decisions are explained in Chapter 4 of this manual.

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METRO-APEX --  2/21/74                  -- INDUSTRIALIST          --
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                     CYCLE  1,  PAGE 102
                                                                                       TEAM   1
------------------------------- MISCELLANEOUS  NOTES  FROM  CYCLE  1 -------------------------------------

      INVESTMENT OF a $  25000.  IN EXOFIRM   8  C     -- RETURNS  $  26250.
                    $  25000.  TOTAL INVESTMENT                    $. 26250.  TOTAL RETURN
                                                                   b

   d CASH TRANSFERS BETWEEN GAME PLAYERS, CYCLE  1
          T O                     F R O M
------------------------//----------------------//--------------------
WHO      AMOUNT         //  WHO      AMOUNT     //        REMARKS
R5   $      600.        //                      //
OP   $      200.        //                      //
```

a INVESTMENT IN AN EXOFIRM BY THE INDUSTRIALIST IS A TOKEN OF LOCAL BUSINESS COMMUNITY SUPPORT FOR A COMPANY LOCATING SOMEWHERE IN APEX COUNTY.

b IF THE FIRM ENTERS THE COMMUNITY, THE INVESTOR WILL REALIZE A RETURN ON HIS INVESTMENT. THE % OF THE RETURN WILL VARY WITH DIFFERENT EXOFIRMS. INVESTMENTS MAY ONLY BE MADE IN FIRMS ANNOUNCED IN THE CURRENT CYCLES METRO-APEX NEWS.

c INFORMATION FOUND IN THE NEWSPAPER INCLUDES THE NAME AND NUMBER OF THE FIRM, THE TYPE OF COMPANY, THE NUMBER OF EMPLOYEES, THE AREA OF PREFERENCE, AND THE SERVICES REQUIRED OF THE JURISDICTION FOR THE FIRM LOCATING IN APEX COUNTY.

d CASH TRANSFERS ARE USED FOR THE EXCHANGE OF MONEY BETWEEN PLAYERS.

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METRO-APEX --  2/21/74                 -- INDUSTRIALIST [illegible] --                                  CYCLE  1.  PAGE 103
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                                       TEAM   1
-------------------------------------REAL ESTATE TRANSACTIONS BY INDUSTRIALIST 6----------------------------------------------
             f
                              S A L E S                                                        P U R C H A S E S
----------------------------------------------------------//------------------------------------------------------------------
    (UP FOR SALE ARE)  (AT)               /                    //  (BID FOR ARE)      (AT)            /
AA   X UNITS   OF     $/U OR      TO   /  SOLD     TOTAL     //   X UNITS   OF     $/U OR    FROM  /  BOUGHT    DEMOL.      TOTAL
e  OR ACRES   TYPE    $/ACRE           /   X       PRICE     //  OR ACRES  .TYPE   $/ACRE          /    X        COST       COST
       d        g       h         i        j                            f        g        h        i        j
 5                                                           //     2.0     V-R   $ 10000.   M     /    2.0   $     0.  $  20000.
10                                                           //     1.0     C-R   $  5000.   D7    /    1.0   $     0.  $   5000.

TOTALS                                           $      0.                                                          $  25000.

                                          ACTION ON ZONING REQUESTS
                                        APPROVED OR REFUSED IN CYCLE  1
                   ------------------------------------------------------------------------------------
                   AA NO.    OLD LAND USE      NEW LAND USE      NO. ACRES     DEMOL. COST     CAUSE FOR REFUSAL*
                     5   k     V-R          l    V-I          m    2.00     n      0.          o
                    10         C-R               V-R               1.00         8550.
                                        *REZONING WAS APPROVED IF NO CAUSE FOR REFUSAL GIVEN
```

e AA IS ANALYSIS AREA.

f DEVELOPED RESIDENTIAL PROPERTY IS IN UNITS. VACANT AND DEVELOPED NON-RESIDENTIAL PROPERTY IS IN ACRES.

g VACANT PROPERTY IS ZONED IN ONE OF SIX ZONING CATEGORIES. DEVELOPED PROPERTY IS ZONED IN ONE OF ELEVEN LAND USE CATEGORIES.

h PRICES ARE QUOTED IN $/UNIT FOR DEVELOPED RESIDENTIAL PROPERTY AND IN $/ACRE FOR VACANT AND DEVELOPED NON-RESIDENTIAL PROPERTY.

i PROPERTY MAY BE SOLD TO OR PURCHASED FROM EITHER THE MARKET OR ANOTHER GAMED PLAYER. CODE "M" REFERS TO THE MARKET--ALL OTHER CODES TO GAMED PLAYERS.

j IN SOME CASES YOU MAY NOT BE ABLE TO SELL OR PURCHASE ALL PROPERTY YOU HAVE REQUESTED. AN EXAMPLE OF THIS WOULD BE AN ATTEMPTED SALE TO A GAMED PLAYER WHO DOES NOT HAVE SUFFICIENT FUNDS TO PAY FOR THE SALE.

k THE OLD LAND USE REFERS TO THE STATUS OF THE PROPERTY PRIOR TO THE REZONING REQUEST. AN INDUSTRIALIST MAY REQUEST A REZONING ONLY FOR PROPERTY WHICH HE OWNS.

l NEW LAND USE IS THE PROPOSED USE OF THE LAND. A REZONING WILL CAUSE ALL DEVELOPED PROPERTY TO BECOME VACANT.

m ALTHOUGH YOU REZONE DEVELOPED RESIDENTIAL PROPERTY BY UNITS, ONCE THE REZONING IS APPROVED THE PARCEL WILL BE IN ACRES.

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METRO-APEX --  2/21/74                        -- INDUSTRIALIST        --                         CYCLE  1.  PAGE 103
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                               TEAM   1
------------------------------------REAL  ESTATE  TRANSACTIONS  BY  INDUSTRIALIST  6----------------------------------------
              f
                          S A L E S                                                P U R C H A S E S
     ---------------------------------------------------//---------------------------------------------------------------
     (UP FOR SALE ARE)  (AT)                /                      //  (BID FOR ARE)          (AT)           /
AA    X UNITS    OF     $/U OR      TO    /  SOLD       TOTAL     //   X UNITS    OF       $/U OR   FROM /  BOUGHT    DEMOL.     TOTAL
e   OR ACRES   TYPE     $/ACRE            /   X         PRICE     //  OR ACRES  , TYPE     $/ACRE        /    X        COST       COST
                 g        h        i         j                              f        g          h        i       j
 5                                                               //       2.0      V-R    $ 10000.   M    /    2.0   $     0.  $  20000.
10                                                               //       1.0      C-R    $  5000.   D7   /    1.0   $     0.  $   5000.

TOTALS---------------------------------------------$        0.                                                                 $  25000.

                                                     ACTION ON ZONING REQUESTS
                                                   APPROVED OR REFUSED IN CYCLE  1
                   -------------------------------------------------------------------------------------
                   AA NO.    OLD LAND USE      NEW LAND USE       NO. ACRES     DEMOL. COST     CAUSE FOR REFUSAL*
                     5    k     V-R         l     V-I          m    2.00      n       0.        o
                    10          C-R               V-R               1.00           8550.
                                                   *REZONING WAS APPROVED IF NO CAUSE FOR REFUSAL GIVEN
```

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n A DEMOLITION FEE (5% OF THE APPRAISED VALUE) IS CHARGED WHEN YOU REZONE DEVELOPED PROPERTY.

0 REASONS FOR REFUSAL MAY INCLUDE: A)TRYING TO REZONE LAND YOU DON'T OWN, AND B)NOT HAVING SUFFICIENT CASH TO PAY THE $100 APPLICATION FEE.

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METRO-APEX --  2/21/74                 -- INDUSTRIALIST                --                    CYCLE  1.  PAGE 105
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                           TEAM   1

     OUTSTANDING DEBITS                                   V
        A.  PROPERTY TAXES                              DELINQUENT AMT             MIN PAYMENT
                                        CURRENT          + 6.00 PERCENT            DUE CYCLE  2

            CENTRAL CITY   --        $     1804.     + $       0.  =             $     1804.
        U   SUBURB         --        $        0.     + $       0.  =             $        0.
            TOWNSHIP 1     --        $    38661.     + $       0.  =       W     $    38661.
            TOWNSHIP 2     --        $        0.     + $       0.  =             $        0.
            COUNTY         --        $     4319.     + $       0.  =             $     4319.

               SUBTOTAL -- DUE IN CYCLE  2                                                       $     44784.

        B.  LOANS                                                UNDERPAYMENT      MIN PAYMENT
                   NO.      BALANCE         RATE     YRS LEFT      PENALTY         DUE CYCLE  2

                    3    $  539979.         6.0         3        $     0.        $   202017.
                   14    $  300000.         4.0         2        $     0.        $   159060.  X

            SUBTOTALS    $  839979.                                              $   361077.
```

U THE TAX RATE IS SET BY THE POLITICIAN'S AND CAN BE CHANGED DURING THE COURSE OF THE GAME.

V IF PAYMENTS MADE ARE INSUFFICIENT TO COVER THE AMOUNT DUE, PENALTY WOULD SHOW HERE.
IF DELINQUENCY CONTINUES A SECOND YEAR, PROPERTY WILL BE CONFISCATED.

W TAXES MUST BE PAID TO AVOID PENALTIES FOR DELINQUENCY.

X LOANS MUST BE PAID TO AVOID A DROP IN CREDIT RATING.

```
METRO-APEX --  2/21/74                   -- INDUSTRIALIST                                   CYCLE  1.  PAGE 104
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                          TEAM   1
-------------------------- p -- CURRENT  PROPERTY  HOLDINGS  AFTER  CYCLE  1 --------------------------------------
                    (DEVELOPED RESIDENTIAL IN UNITS. ALL OTHER VALUES ARE IN ACRES)
----------------------------------------------------------------------------------------------------------------
               //          R E S I D E N T I A L          //          N O N - R E S I D E N T I A L
          q    //-----------------------------------------//------------------------------------------------------
               //      S I N G L E      / M U L T I P L E //      COMMERCIAL      /      INDUSTRIAL      / OFFICE / AGRICULT
               //-----------------------/-----------------//----------------------/----------------------/--------/---------
AA r   STATUS  //     R-1     R-2     R-3/    M-1     M-2 //     LOCAL  REGIONAL /   LOCAL   S EXOG. /   EXOG./
---------------//-----------------------------------------//------------------------------------------------------

 5  VACANT     //           0.0              0.0          /            0.0                 2.00           0.0       0.0
 ------------------------------------------------------------------------------------------------------------------
10  VACANT     //           1.35             0.0          /            0.0                 0.0            0.0       0.0
 ------------------------------------------------------------------------------------------------------------------
23  DEVELOPED  //      0       0       0       0       0  /    0.0      0.0      0.0     27.50 t     0.0       0.0
------------------------------------------------------------------------------------------------------------------
```

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[p] THIS TABLE IS A SUMMARY OF ALL THE CURRENT LAND HOLDINGS OF THIS INDUSTRIALIST. THE DEVELOPED 27.5 ACRES IS THE LAND WHICH HIS PLANT OCCUPIES (SEE PRINTOUT SHEET "INVENTORY OF PHYSICAL FACILITIES").

[q] ZONING CATEGORIES-SEE GLOSSARY FOR EXPLANATION.

[r] LAND USE TYPES-SEE GLOSSARY UNDER "DEVELOPMENT TYPE."

[s] LAND, WHERE INDUSTRIALIST'S FIRM IS LOCATED, IS ZONED EXOGENOUS INDUSTRIAL. TO EXPAND A PLANT, THE INDUSTRIALIST MUST OBTAIN VACANT LAND ZONED INDUSTRIAL OR HAVE THE VACANT LAND REZONED.

[t] EXOGENOUS REFERS TO AN INDUSTRY OR BUREAUCRATIC FIRM THAT DEPENDS PRIMARILY UPON MARKETS OUTSIDE THE LOCAL AREA.

```
METRO-APEX --   2/21/74                    -- INDUSTRIALIST                                         CYCLE  1.   PAGE 106
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                                  TEAM   1

                                   PROFITS AND INCOME TAX STATEMENT
       y
  I.   INCOME CALCULATED DURING CYCLE  1

        A. 5.00 PERCENT INTEREST ON CASH END OF CYCLE  0                      $   12500.
        B. PRODUCT SALES                                                         9453132.
        C. CASH TRANSFERS (FROM OTHER PLAYERS)                                        0.
        D. LAND SALES                                                                 0.
        E. RETURN FROM EXOFIRM INVESTMENTS                                        26250.

           TOTAL INCOME IN CYCLE  1                                                                $ 9491880.

  II.  OPERATING COSTS

        A. LABOR                                                              $ 2472000.
        B. MATERIALS                                                             1704999.
        C. FUEL                                                                   434000.
        D. GENERAL ADMINISTRATION                                                2169999.
        E. INVENTORY CARRYING COSTS                                                87343.
        F. AIR POLLUTION CONTROLS OPERATION                                        12090.
        G. PLANT MAINTENANCE                                                      600000.
   z    H. CONSULTANTS - AIR POLLUTION EMISSION DATA      a                         5000.
        I. CONSULTANTS - AIR AND WATER CONTROL SYSTEM DATA                         10000.
        J. LOAN PAYMENTS                                                          202020.
        K. PROPERTY TAXES                                                          42423.
        L. CASH TRANSFERS (TO OTHER PLAYERS)                                         800.  d
        M. CAMPAIGN CONTRIBUTIONS                                                   7000.
        N. ZONING APPLICATION FEES AND/OR DEMOLITION COSTS                          8750.
        O. CONSULTANTS - WATER POLLUTION EFFLUENT DATA    b                         5000.
        P. WATER POLLUTION CONTROL EQUIPMENT OPERATION                                 0.
        Q. COST OF PURCHASING WATER                                                14880.
        R. COST OF MUNICIPAL SEWAGE TREATMENT      C                                   0.
        S. COST OF REMOVING SOLID WASTE                                             1537.
        T. INVESTMENTS IN EXOFIRMS                                                 25000.

           TOTAL OPERATING COSTS IN CYCLE  1                                                       $ 7802835.

  III. PROFITS AND INCOME TAXES

        A. GROSS PROFIT (I. - II.)                                                                 $ 1689045.
        B. TAX DEPRECIATION ALLOWANCE   e                                                          -  375000.
        C. TOTAL TAXABLE INCOME (A.- B.)                                                           $ 1314045.
        D. FEDERAL AND STATE INCOME TAXES (55 PERCENT OF C.)                                       -  722725.
        E. NET PROFIT (A.-D.)                                                                      $  966320.
```

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y INCOME IS NEW INCOME REALIZED DURING THE CYCLE AND DOES NOT INCLUDE CASH CARRY OVER FROM LAST CYCLE OR NEW LOANS GRANTED.

z THESE ITEMS ARE CALCULATED FROM PRODUCTION LEVEL AND THE "COST FACTORS FOR CYCLE 1" IN THE PREVIOUS PRINTOUT.

a CONSULTANT DATA COSTS $5000 PER STUDY. IF ORDERED IN WORKSHEET THE DATA APPEARS IN PRINTOUT-SEE EXAMPLE IN LAST PAGE OF PRINTOUT.

b SOME INDUSTRIALISTS PURCHASE WATER FROM THE PUBLIC WATER SUPPLY-OTHERS DRAW WATER FROM THE RIVER. SEE YOUR MANUAL CHAPTER 6. PURCHASED WATER COSTS CAN BE CHANGED BY THE POLITICIANS.

c SOME INDUSTRIES DUMP THEIR WASTE WATER EFFLUENT INTO THE RIVER AND SOME TO THE SEWAGE TREATMENT PLANT. SEE YOUR MANUAL CHAPTER 6. SEWAGE TREATMENT COSTS CAN BE CHANGED BY THE POLITICIANS.

d REZONING FEE OF $100.00 FOR EACH REZONING DEMOLITION COSTS ARE 5% OF APPRAISED VALUE.

e DEPRECIATION ALLOWANCE PERMITS THE INDUSTRIALIST TO MAKE SOME NON-TAXABLE INCOME. MAXIMUM ALLOWANCE FOUND ON "COST FACTORS" PAGE OF PRINTOUT.

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METRO-APEX --  2/21/74                         -- INDUSTRIALIST [illegible] --                         CYCLE  1.  PAGE 107
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                                      TEAM   1
                                                  [illegible]
                                              CASH IN - CASH OUT STATEMENT

     IV.  CASH IN

          A. CASH CARRYOVER FROM CYCLE  0                                          $  250000.
          B. TOTAL CYCLE INCOME                                                       9491880.  f
          C. NEW LOANS REQUESTED (AND APPROVED)  g                                    300000.

             TOTAL CASH IN                                                                         $10041880.

     V.   CASH OUT

          A. TOTAL CYCLE OPERATING COSTS                                           $ 7802835.  h
          B. FEDERAL AND STATE INCOME TAXES                                           722725.
          C. CAPITAL EXPENDITURES

             1. PRODUCTION EQUIPMENT EXPANSION                       0.
             2. BUILDING EXPANSION                                   0.
             3. LAND PURCHASES                                   25000.
             4. AIR POLLUTION CONTROL EQUIPMENT      j           55000.
             5. WATER POLLUTION CONTROL EQUIPMENT                    0.

             TOTAL CAPITAL EXPENDITURES                                            $   80000.

          D. DIVIDENDS PAID  k                                                       1400000.

          TOTAL CASH OUT                                                                           $10005559.

     VI.  CASH AVAILABLE FOR CYCLE  2 (IV - V.)                                                    $   36321.

     VII. FINANCIAL STANDING  -- OVERALL

          A.  TOTAL NET WORTH                                                                      $ 9184649.
              (CASH + PHYSICAL PLANT + MARKET VALUE OF INVENTORY CARRYOVER - OUTSTANDING LOANS)
          B.  NET WORTH AT END OF CYCLE  0                                                         $ 7558000.
          C.  PERCENT CHANGE FROM CYCLE  0                                                             21.52
          D.  MAXIMUM NEW LOAN POSSIBLE AT YOUR CREDIT RATING OF A-1                               $ 2167408.
```

f TOTAL CYCLE INCOME CALCULATED ON PREVIOUS PAGE OF PRINTOUT.

g LOAN REQUEST WILL BE GRANTED AS LONG AS IT DOES NOT EXCEED LINE VIII D, ROUNDED DOWN TO THE NEAREST $10,000, E.G. #2,160,000. MAXIMUM NEW LOAN POSSIBLE IS DEPENDENT ON TOTAL NET WORTH.

h TOTAL CYCLE OPERATING COSTS CALCULATED ON PREVIOUS PAGE OF PRINTOUT.

i MINIMUM INCREMENT EXPANSIONS FOR THESE ITEMS ARE IN CHAPTER 6 OF THE MANUAL.

j INVESTMENT IN NEW EQUIPMENT ONLY.

k DIVIDENDS PAID ARE A DECISION OF THE BOARD OF DIRECTORS (GAME OPERATOR). RECOMMENDATIONS MAY BE OFFERED BY THE PLANT MANAGER (ROLE PLAYER). SEE MANUAL, CHAPTER 4, ANNOTATED WORKSHEET, SECTION V.

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METRO-APEX --  2/21/74                    -- INDUSTRIALIST                                    CYCLE  1,  PAGE 108
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                            TEAM   1

                                          PRODUCTION INFORMATION

                                   CYCLE  1                  CYCLE  0                    CYCLE -1

MAXIMUM CAPACITY       m         3500000.BBLS              3500000.BBLS               3500000.BBLS
UNITS PRODUCEC                   3100000.BBLS              2550000.BBLS               2700000.BBLS
PERCENT OF CAPACITY USED              88  PCT                   73  PCT                    77  PCT
INVENTORY                         400000.BBLS               200000.BBLS                300000.BBLS
INVENTORY UNITS SOLD                   0.BBLS                    0.BBLS                100000.BBLS
NUMBER OF EMPLOYEES                  309                       235                        270

INVENTORY CARRYOVER TO CYCLE 2  o   545896.BBLS

MAXIMUM CAPACITY FOR CYCLE  2  p   3500000.BBLS

                                          SALES INFORMATION

AVERAGE INDUSTRY WIDE PRICE       $    3.24  PER BBL     $    3.15  PER BBL     $    3.10  PER BBL
THIS FIRM'S PRICE                 $    3.20  PER BBL     $    3.25  PER BBL     $    3.10  PER BBL
ESTIMATED SALES                  3200000.BBLS           2600000.BBLS           2800000.BBLS
ACTUAL SALES                     2954104.BBLS           2350000.BBLS           2800000.BBLS
ESTIMATED SALES IN DOLLARS    r  $ 10239999.         $  8450002.           $  8680002.
ACTUAL SALES IN DOLLARS          $  9453132.         $  7637501.           $  8680002.
RATE O* PROFIT (NET PROFIT/TOTAL VALUE PLANT AND EQUIPMENT          11.76 PERCENT

                                   INVENTORY  OF  PHYSICAL  FACILITIES
                                         AT PRODUCTION LOCATION

LAND                 TOTAL LAND AREA (ACRES) =       27.50                          LAND VALUE  = $      662149.
                    VACANT LAND AREA (ACRES) =        0.0
                 VACANT LAND WILL ACCOMODATE          0.0   SQ.FT. OF ADDITIONAL BUILDING

BUILDING             BUILDING AREA (SQFT) =   250000.00                        BUILDING VALUE  = $    4000000.

EQUIPMENT                                       GENERAL PRODUCTION EQUIPMEN7 VALUE  = $     3500000.

                                                 AIR POLLUTION CONTROL EQUIPMENT VALUE  = $       55000.
           PROCESS       CONTROL       STATUS          VALUE
              4             23        OPERATING  q   $ 55000.

                                               WATER POLLUTION CONTROL EQUIPMENT VALUE  = $           0.

                                                               TOTAL EQUIPMENT VALUE  = $     3555000.

                                                 TOTAL VALUE OF PHYSICAL FACILITIES  = $     8217149.
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l PRODUCTION INFORMATION RECORD FOR LAST 3 CYCLES.

m MAXIMUM CAPACITY SET BY AMOUNT OF PLANT AND EQUIPMENT AVAILABLE AT BEGINNING OF CYCLE.

n UNITS RRODUCED IS A DECISION OF THE PLANT MANAGER (ROLE PLAYER). SEE MANUAL, CHAPTER 4, ANNOTATED WORK SHEET, SECTION I, B.

o INVENTORY CARRYOVER CALCULATED BY THE SUM OF PRODUCTION PLUS INVENTORY ON BOND MINUS CYCLE SALES.

p MAXIMUM PRODUCTION CAPACITY FOR NEXT CYCLE WOULD HAVE INCREASED IF PLANT AND EQUIPMENT EXPANSION HAD BEEN PURCHASED LAST CYCLE. (THERE IS A ONE CYCLE LAG BETWEEN EXPANSION EXPENDITURES AND INCREASED CAPACITY.) MAXIMUM PRODUCTION CAPACITY WILL DECREASE UNLESS PLANT MAINTENANCE EXPENDITURES OF 8% OF TOTAL VALUE OF BUILDING AND EQUIPMENT IS MADE. PURCHASE OF ADDITIONAL PLANT AND EQUIPMENT INCREASES NET WORTH AND THEREFORE MAXIMUM LOANS AVAILABLE.

q POLLUTION CONTROL EQUIPMENT WHICH HAS BEEN PURCHASED IS SHOWN HERE AS PART OF TOTAL EQUIPMENT VALUE.

r ACTUAL SALES ARE DETERMINED BY THE NATIONAL ECONOMY AND BY DIFFERENCE BETWEEN THIS FIRMS' PRICE AND INDUSTRY WIDE PRICE FOR THIS PRODUCT. ESTIMATES OF SALES CAN BE MADE FROM TRENDS INDICATED FROM PRIOR YEARS (A ABOVE). SEE ALSO THE PLOTS OF SALES AND PRICES IN THE MANUAL, CHAPTER 6.

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METRO-APEX --  2/21/74                       -- INDUSTRIALIST [illegible] --                                CYCLE  1.   PAGE 109
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                                       TEAM   1

                                             COST  FACTORS  FOR  CYCLE   2

                  A.  AVERAGE ANNUAL WAGE PER EMPLOYEE                              $    8399.99
                  B.  MATERIAL COSTS PER PRODUCT UNIT                               $       0.58
                S C.  AVAILABLE FUELS AND COST PER PRODUCT UNIT
                        1. LOW GRADE COAL                                           $       0.15
                        2. HIGH GRADE COAL                                          $       0.17
                  t     3. LOW GRADE OIL                                            $       0.14
                        4. HIGH GRADE OIL                                           $       0.19
                        5. NATURAL GAS                                              $       0.31
                  D.  GENERAL ADMINISTRATION COSTS PER PRODUCT UNIT                 $       0.70
                S E.  INVENTORY CARRYING COSTS PER PRODUCT UNIT                     $       0.17
                  F.  FED. AND STATE INCOME TAX RATE                                       55 PERCENT
                      (PERCENT OF TOTAL TAXABLE INCOME)
               || G.  TAX DEPRECIATION ALLOWANCE RATE                                       5 PERCENT
                      (PERCENT OF VALUE OF BUILDINGS AND EQUIPMENT)
                  H.  MAX. TAX DEPRECIATION ALLOWANCE FOR CYCLE   2                  $  377750.
                      (INCLUDING AMOUNTS NOT CLAIMED IN PRIOR CYCLES)
                  I.  PLANT MAINTENANCE RATE                                                8 PERCENT
                V     (PERCENT OF VALUE OF BUILDINGS AND EQUIPMENT)
                  J.  MAINTENANCE EXPENDITURE REQUIRED IN CYCLE  2                  $  604400.
                  K.  CONSULTANT FEE - POLLUTION EMISSION DATA                          $5000
                X L.  CONSULTANT FEE -- CONTROL SYSTEMS DATA                            $5000
                  M.  ZONING APPLICATION FEE                                            $ 100
                  N.  FUEL IN USE IN CYCLE  1                                TYPE  1  (SEE CODE UNDER C. ABOVE)
                  O.  WATER COST PER PRODUCT UNIT                                   $        0.32/1000 GALS.
                S P.  SEWAGE TREATMENT COST                                         $        0.32/1000 GALS.
                  Q.  SOLID WASTE REMOVAL FEE                                       $        4.50 PER TON

                                        SOLID WASTE GENERATED
   1. INDUSTRIAL PROCESSES                                            0. TONS
   2. RECOVERY FROM AIR POLLUTION CONTROL                 W         341. TONS
   3. RECOVERY FROM WATER POLLUTION CONTROL                           0. TONS

                                        EMISSION DATA FROM SURVEY PURCHASED CYCLE 1

                                                                     EMISSION RATES (LB/HR)                    y
   PRODUCTION           CONTROL SYSTEMS INSTALLED X  PARTICULATES  SULPHUR    CARBON     NITROGEN   HYDRO-     SMOKE     ODOR
    PROCESS              AND OPERATING STATUS                      DIOXIDE    MONOXIDE   OXIDES     CARBONS

      1                   0      0      0           1896.85     1716.20     18.07      316.14      5.42        5         0
      2                   0      0      0           6000.00        0.0       0.0         0.0       0.0         0         0
      3                   0      0      0           2000.00        0.0       0.0         0.0       0.0         0         0
      4                  23      0      0              0.50        0.0       0.0         0.0       0.0         0         0

   NOTE -- STATUS = POSITIVE WHEN CONTROL WAS OPERATED
           STATUS = NEGATIVE WHEN CONTROL NOT IN OPERATION

                                        WATER EFFLUENT DATA PURCHASED IN CYCLE 1  X

   WATER POLLUTION                     EFFLUENT VOL.   TEMP.      D.O.      B.O.D. NUTRIENTS  TOT.DIS.     y     COLIFORM
   CONTROL SYSTEMS                       GALS/UNIT    DEGS.F.     MG/L      MG/L     MG/L     SOLIDS              MPN/100ML
    0    C    0    0                       5.00       64.000      0.100     2.000    2.000    110.000              17.00
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THESE COSTS WILL BE APPLIED TO THE NUMBER OF UNITS PRODUCED IN THE NEXT CYCLE.TO
YIELD OPERATING COSTS FOR THAT CYCLE; THEREFORE, OPERATING COSTS CAN BE CALCULATED
WHEN A PRODUCTION LEVEL HAS BEEN SET. SEE THE MANUAL, CHAPTER 4, ANNOTATED WORKSHEET,
SECTION I. EMPLOYEE WAGE RATES MAY BE CHANGED DUE TO UNION NEGOTIATION. WATER
s AND SEWAGE COSTS MAY BE CHANGED BY THE POLITICIANS.

AVAILABLE FUEL OPTIONS ARE LISTED HERE. NO NEW EQUIPMENT IS REQUIRED TO CHANGE FUELS.
FUEL USED IN LAST CYCLE IS NOTED UNDER ITEM N. ADDITIONAL INFORMATION ABOUT THESE
t FUEL OPTIONS ARE IN CHAPTER 6 OF THE MANUAL.

IF THE MAXIMUM TAX DEPRECIATION ALLOWANCE IS NOT ALL CLAIMED, THE UNCLAIMED PORTION
u WILL BE ADDED TO THE ANNUAL AMOUNT AND MAY BE CLAIMED IN THE FOLLOWING CYCLE.

v PLANT MAINTENANCE EXPENDITURE MUST BE MADE OR LOSS OF PRODUCTION CAPACITY WILL OCCUR.

THIS IS A SUMMARY OF SOLID WASTES GENERATED BY THIS INDUSTRY. INSTALLATION OF CONTROL
w EQUIPMENT MAY RESULT IN ADDITIONAL SOLID WASTES.

THIS IS A SAMPLE OF THE TYPE OF INFORMATION FURNISHED WHEN POLLUTION CONSULTANT DATA
IS ORDERED. CONSULTANT COSTS ARE $5000 EACH FOR AIR AND WATER DATA. (EMISSION AND
EFFLUENT DATA FURNISHED COVERS ALL OF THE PLANT PROCESSES WHICH HAVE POLLUTION POTEN-
TIAL-SEE CHAPTER 6 OF THE MANUAL). AN EXAMPLE OF CONTROL SYSTEM DATA WHICH WAS PUR-
x CHASED IS SHOWN ON THE NEXT PAGE OF PRINTOUT.

SEE MANUAL, CHAPTER 2, GLOSSARY FOR DEFINITION OF POLLUTANTS AND UNITS. SMOKE
EMISSIONS ARE SPECIFIED IN RINGELMANN NUMBER AND ODOR EMISSIONS IN STINKLEMAN
y NUMBER.

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METRO-APEX --  2/21/74                      -- INDUSTRIALIST --                                        CYCLE  1,  PAGE 110
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                                     TEAM   1
                   AIR POLLUTION CONTROL DATA PURCHASED BY DUSTY RHODES' CEMENT COMPANY   FOR $5,000
4                          z
   PROCESS   NAME                             CONTROL SYSTEM
                                           b  NUMBER     NAME
      1      COMBUSTION                         0
   NO PARTICULAR CONTROLS AVAILABLE FOR THIS PROCESS
-----------------------------------------------------------------------------------------------------------
   PROCESS   NAME                             CONTROL SYSTEM
                                              NUMBER     NAME
      2      BALL MILLS                        20        BAG HOUSES (BALL MILL RAW MATERIALS)          d
                    INITIAL                    PER UNIT                    C O N T R O L   E F F I C I E N C Y
                a  INVESTMENT          c   OPERATING COST              PERCENT REDUCTION            /  UNIT REDUCTION
                    330000.                    0.0235          PART    SO2      CO      NOX     HC /   SMOKE    ODOR
                                                               99.50   0.0      0.0     0.0     0.0 /    0        0
-----------------------------------------------------------------------------------------------------------
   PROCESS   NAME                             CONTROL SYSTEM
                                              NUMBER     NAME
      2      BALL MILLS                        22        BAG HOUSES (FINISH)
                    INITIAL                    PER UNIT                    C O N T R O L   E F F I C I E N C Y
                   INVESTMENT              OPERATING COST              PERCENT REDUCTION            /  UNIT REDUCTION
                    330000.                    0.0235          PART    SO2      CO      NOX     HC /   SMOKE    ODOR
                                                               99.50   0.0      0.0     0.0     0.0 /    0        0
-----------------------------------------------------------------------------------------------------------
   PROCESS   NAME                             CONTROL SYSTEM
                                              NUMBER     NAME
      3      KILNS                             21        BAG HOUSES (ROTARY KILNS)
                    INITIAL                    PER UNIT                    C O N T R O L   E F F I C I E N C Y
                   INVESTMENT              OPERATING COST              PERCENT REDUCTION            /  UNIT REDUCTION
                   1000000.                    0.0588          PART    SO2      CO      NOX     HC /   SMOKE    ODOR
                                                               99.50   0.0      0.0     0.0     0.0 /    0        0
-----------------------------------------------------------------------------------------------------------
   PROCESS   NAME                             CONTROL SYSTEM
                                              NUMBER     NAME
      4      CAR LOADING                       23        BAGHOUSES (CARLOADING)
                    INITIAL                    PER UNIT                    C O N T R O L   E F F I C I E N C Y
                   INVESTMENT              OPERATING COST              PERCENT REDUCTION            /  UNIT REDUCTION
                     55000.                    0.0039          PART    SO2      CO      NOX     HC /   SMOKE    ODOR
                                                               99.50   0.0      0.0     0.0     0.0 /    0        0
```

z THIS IS AN EXAMPLE OF THE TYPE OF INFORMATION PROVIDED FOR A $5000 CONSULTANT FEE FOR AIR POLLUTION CONTROL SYSTEM DATA. NORMALLY A LISTING OF CONTROLS FOR ALL OF THE PLANT PROCESSES WHICH HAVE AIR POLLUTION POTENTIALS WILL BE PROVIDED.

a,b THE CONTROL SYSTEMS AVAILABLE WILL BE SPECIFIED AS A CONTROL FOR A PARTICULAR PLANT PROCESS. SEE CHAPTER 6 OF THE MANUAL FOR PROCESSES WITH AIR POLLUTION POTENTIAL. IF A CONTROL IS PURCHASED, THE WORKSHEET ENTRY WILL REQUIRE PROCESS NUMBER AND CONTROL NUMBER SINCE SOME PROCESSES HAVE MORE THAN ONE CONTROL OPTION AVAILABLE.

c THIS CONTROL SYSTEM WILL REQUIRE A ONE TIME CAPITAL INVESTMENT OF $5500 AND WILL COST $0.0039 PER PRODUCTION UNIT PER CYCLE TO OPERATE.

d THE CONTROL EFFICIENCY IS THE PERCENTAGE OF A PARTICULAR POLLUTANT REMOVED BY THE CONTROL SYSTEM, I.E., SYSTEM 23 WILL REDUCE PARTICULATE EMISSION FROM PROCESS 4 BY 99.5 PERCENT.

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METRO-APEX --  2/21/74                 -- INDUSTRIALIST      --                      CYCLE  1.  PAGE 111
ENVIRONMENTAL MANAGEMENT INSTITUTE                                                   TEAM   1
            e WATER POLLUTION CONTROL DATA PURCHASED BY DUSTY RHODES' CEMENT COMPANY    FOR $5000

       CONTROL SYSTEM
        NUMBER  NAME
        56    PUMP TO SEWAGE TREATMENT PLANT                            h
       f          INITIAL          PER UNIT                       C O N T R O L   E F F I C I E N C Y
               INVESTMENT      g OPERATING COST                  PERCENT REDUCTION
                    0.              0.0            FLOW     TEMP     D.O.     BOD      NUTR     T.D.S.   COLI.
                            SEE COST P. ABOVE      0.0      0.0      0.0      0.0      0.0      0.0      0.0
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e THIS IS AN EXAMPLE OF THE TYPE OF INFORMATION PROVIDED FOR A $5000 CONSULTANT FEE FOR WATER POLLUTION CONTROL SYSTEM DATA. NORMALLY, SEVERAL OPTIONAL SYSTEMS WILL BE PROVIDED.

f THE CONTROL SYSTEM AVAILABLE WILL BE APPLICABLE TO ALL OF THE WATER EFFLUENT FROM THE PLANT. (NOT A PARTICULAR PROCESS AS IN THE AIR POLLUTION CONTROL SYSTEM EXAMPLE.)

g THE ONE-TIME CAPITAL COST (IF ANY) OF THE CONTROL SYSTEM AND THE YEARLY COST PER PRODUCTION UNIT FOR ITS OPERATION IS PROVIDED IN THE CONSULTANTS' DATA. IN THE EXAMPLE SHOWN, THE SEWAGE TREATMENT COST IS VARIABLE BY THE POLITICIANS AND SO IS LISTED IN THE COST FACTORS SECTION OF THE PRINTOUT UNDER ITEM .

h THE PERCENT REDUCTION IN EFFLUENT POLLUTANTS IS PROVIDED AS PART OF THE CONSULTANTS' DATA. IN THIS EXAMPLE, THE SEWAGE TREATMENT PLANT OPTION ABSORBS ALL OF THE PLANTS EFFLUENTS AND CONTROL EFFICIENCY IS NOT APPLICABLE (IT IS ACTUALLY 100% SINCE THERE ARE NO RIVER DUMPED EFFLUENTS.)

The following pages include the METRO-APEX NEWS which will give you a basis regarding some of the decisions made for Cycle 1. It will also provide you with a history of some of the problems in APEX County.

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a            METRO-APEX NEWS
--------------------------------------------------------------------------------------------------------------
TEAM 1, EDITION  1                   SUNDAY, JUNE 30, 1974                ANNOTATED PRINTOUT FOR CHAPTER 8
--------------------------------------------------------------------------------------------------------------

N A T I O N A L   N E W S   H E A D L I N E S  b
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AUTOMOBILE PRODUCTION RECOVERS FROM SLUMP, HIGHEST SALES IN HISTORY PREDICTED.

SINGLE REAL ESTATE DEVELOPER SPEAKS IN FAVOR OF OPEN HOUSING AT CONGRESSIONAL COMMITTEE MEETING--OTHERS NEGATIVE.

U. S. CENSUS BUREAU ISSUES REPORT STATING THAT NET ANNUAL ADDITIONS TO THE HOUSING STOCK HAVE DECLINED TO 800,000 UNITS   C
LEAVING A GAP OF 200,000 BETWEEN NEW UNITS ADDED AND NET NEW FAMILY FORMATIONS.CENTRAL CITY HOUSING SITUATION CRITICAL.

DEFENSE SPENDING IS AGAIN AT AN ALL TIME HIGH-AS CONGRESSIONAL CRITICS WARN OF GUNS VS. BUTTER CONFLICT.
U. S. UNEMPLOYMENT RATE THE PAST YEAR WAS  4.1 PERCENT
S T A T E   N E W S   H E A D L I N E S  b
--------------------------------------------------------------------------------------------------------------

POOR PEOPLE'S MARCH ON THE STATE CAPITOL INFURIATES LAWMAKERS WHO SAY THEY WON'T BOW TO PRESSURE GROUP TACTICS.

STATE BOARD OF HEALTH ANNOUNCES PLANS TO WORK WITH COUNTY HEALTH AGENTS TO CRACK DOWN ON UNSAFE SEPTIC TANKS IN URBAN
FRINGES OF EVERY METROPOLITAN AREA IN THE STATE. OLD SEPTIC TANKS AND INADEQUATE SEWER SYSTEMS MAKE SUB-DIVISION DEVEL-
OPMENTS DANGEROUS.

EDUCATORS PRESS STATE FOR GREATER AID TO LOCAL SCHOOL DISTRICTS. ARGUING WE'RE FALLING BEHIND THE NATIONAL LEADERS.

APEX CITED AS ONE OF THE WORST MIDDLE-SIZED CITIES WHO HAVE LET CAPITAL PLANT INVESTMENTS IN THE DOWNTOWN DETERIORATE.   C

DEMOCRAT-REPUBLICAN DEADLOCK IN STATE SENATE IS BROKEN AS GOVERNOR INTERVENES TO FORCE AN EDUCATION-WELFARE PACKAGE.

WELFARE MOTHERS IN TEN COUNTIES SIT IN TO PROTEST LOW ALLOCATIONS FROM STATE AND COUNTIES. TAXPAYER ANGER OVER DEMON-
STRATIONS IN STATE IS GROWING. MAKING INCREASED STATE WELFARE PAYMENTS UNLIKELY THIS YEAR.
L O C A L   N E W S   I T E M S  b
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a THE METRO-APEX NEWS IS PUBLISHED EACH CYCLE AND IS A PRIME SOURCE OF INFORMATION ABOUT CURRENT PROBLEMS AND EVENTS AND THEIR IMPACT ON APEX COUNTY.

b THE METRO-APEX NEWS FEATURES NATIONAL NEWS HEADLINES, STATE NEWS HEADLINES AND LOCAL NEWS ITEMS. THE "LOCAL NEWS ITEMS" ARE PRESENTED UNDER SUB-HEADINGS OF METROPOLITAN AND COUNTY, CENTRAL CITY, SUBURB, TOWNSHIP 1, TOWNSHIP 2, AND BUSINESS PAGE.

c NATIONAL AND STATE NEWS REFLECTS THE GENERAL STATE OF THE ECONOMY AND NEW GOVERNMENTAL POLICIES WHICH MAY IMPACT ON VARIOUS SEGMENTS OF THE APEX COMMUNITY.

d EACH YEAR CERTAIN ISSUES WILL APPEAR IN THE METRO-APEX NEWS WHICH REQUIRE DECISIONS FROM ALL ROLE PLAYERS. EACH ISSUE IS IDENTIFIED BY AN ISSUE NUMBER. THE ISSUES CONSIST OF A STATEMENT OF THE ISSUE AND SEVERAL PROPOSED ALTERNATIVE ACTIONS. EACH PLAYER SHOULD CHOOSE THE ALTERNATIVES HE FAVORS AND FILL OUT THE ELITE OPINION POLL OF HIS WORKSHEET.

e SOME ALTERNATIVES PROPOSE THE IMPLEMENTATION OF SPECIFIC PROJECTS. PROJECT NUMBERS SHOULD NOT BE CONFUSED WITH ISSUE NUMBERS.

f LOCAL NEWS ITEMS ARE IDENTIFIED BY THE ANALYSIS AREA IN WHICH THEY ORIGINATED.

g THE BUSINESS PAGE LISTS EXOFIRMS WHICH WOULD LIKE TO LOCATE IN APEX. THE FIRM WILL NORMALLY NOT LOCATE IN APEX UNLESS THE SPECIFIED CONDITIONS ARE MET.

h THE LOCATIONS PREFERED BY THE EXOFIRM ARE LISTED IN ORDER OF PREFERENCE, IE., AA 10 IS THE FIRST PREFERENCE, AA 25, SECOND CHOICE, ETC.

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          M E T R O P O L I T A N   A N D   C O U N T Y   b
          -------------------------------------------
          -------------------------------------------
RUNWAY EXPANSION NEEDED FOR APEX AIRPORT. COST SET AT $350,000. PROJECT NO. 109. e
                              d
....PRECEDING IS ISSUE   42   POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED

---- ALTERNATIVE  1      FAVOR RUNWAY PROJECT 109

---- ALTERNATIVE  2      POSTPONE AND RECONSIDER   e

---- ALTERNATIVE  3      OPPOSE RUNWAY PROJECT 109

COUNTY ROAD COMMISSIONER DECLARES THAT SUGGESTED CONTROLS ON ST. ANDRE ASPHALT COMPANY WILL CAUSE AN INCREASE IN COSTS
OF HIGHWAY CONSTRUCTION IN THE AREA. THIS MAY SET A PRECEDENT WHICH COULD ULTIMATELY MEAN HIGHER TAXES STATEWIDE.

STATE INSPECTOR LIKENS DUST PROBLEM FROM DUSTY ROADS CEMENT PLANT BAG-FILLING OPERATION TO CAUSES OF SILICOSIS IN MINING
 OPERATIONS.

STATE LEGISLATURE ENACTS BAN ON ALL OPEN BURNING DUMPS. APEX SOLID WASTE MANAGER FACES MOUNTING PROBLEMS -- INADEQUATE
INCINERATION, GROWING AMOUNTS OF WASTE, PUBLIC DISTRUST OF LANDFILLS, AND OUTDATED COLLECTION EQUIPMENT. APEX MAY BE
BURIED IN ITS OWN TRASH.

AA  3 - f
OLD TIME RESIDENT CLAIMS, 'THIS DRATTED POLLUTION IS GETTING WORSE EVERY YEAR. DONT KNOW HOW LONG I CAN HOLD OUT.
AA  4 -
INDUSTRY GROUP BLAMES HOMEOWNER BACKYARD BURNING AS PRIME CAUSE OF AREA SMOG.
AA  5 -
SMOKE HAZE INCREASES HAZARDS OF AIRCRAFT LANDING, PILOT TELLS AREA KIWANIS.

          C E N T R A L   C I T Y   b
          ------------------------
          ------------------------
PLANS COMPLETED FOR NEW CITY HALL, FUNDING SOUGHT. A $1.2 MILLION BOND ISSUE IS PROPOSED TO FUND A MODERN, EFFICIENT,
WELL-DESIGNED CITY HALL TO REPLACE PRESENT 80-YEAR-OLD BUILDING IN AA 6. GENERAL SUPPORT OF COMMUNITY LEADERS IS ASKED
FOR THIS LONG-OVERDUE IMPROVEMENT (PROJECT 86).

....PRECEDING IS ISSUE    1  POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED

---- ALTERNATIVE  1      FAVOR PROJECT 86

---- ALTERNATIVE  2      POSTPONE AND RECONSIDER

---- ALTERNATIVE  3      OPPOSE PROJECT 86

SUMMER DAY CAMPS PROPOSED FOR DISADVANTAGED YOUTH. STATE FUNDS, WITH CHARITY CONTRIBUTIONS, MAKE $100,000 AVAILABLE,
PROVIDED CITY CAN COME UP WITH $120,000. PROGRAM NO. 10.
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ANNEXATION OF MAPLE GROVE AREA (AA 12) TO GO TO A VOTE. FAVORED BY CHAMBER OF COMMERCE DUE TO POSSIBLE INDUSTRIAL SITES AT FREEWAY INTERCHANGE. THE ANNEXATION OF THIS AREA IS ALSO OPPOSED BY ANTI-TAX GROUPS BECAUSE OF THE COST OF PUBLIC IMPROVEMENTS REQUIRED. SCHOOL DISTRICT ANNEXATION TIED TO CITY VOTE - BOTH MUST BE APPROVED TOGETHER.

....PRECEDING IS ISSUE 5C DECIDED BY OPINION POLL MAJORITY AND REFERENDUM

---- ALTERNATIVE 1 FAVOR ANNEXATION OF AA 12

---- ALTERNATIVE 2 AVOID THE ISSUE

---- ALTERNATIVE 3 OPPOSE THE ANNEXATION

COMMUTERS REPORT IMPAIRMENT OF SENSE OF SMELL AFTER WEEK'S TRAVEL PAST TROJAN VARNISH COMPANY IN ANALYSIS AREA 10. DANNY DINKS, WHO PASSES THE PLANT FOUR TIMES DAILY, COMPLAINS HE CAN'T SMELL HIS GIRL'S PERFUME ANYMORE.

AA 4 -
RESIDENTS PRESS DEMANDS FOR SMALL CITY PARKING LOT AS LOCAL PARKING PROBLEMS MOUNT AND DOUBLE-PARKING CREATES SNARLS.

AA 9 -
HUGE CRACKS IN LOCAL STREETS CAUSE MAJOR ACCIDENT AS DELIVERY TRUCK SPINS OUT OF CONTROL. IMMEDIATE RESURFACING A 'MUST'

AA 3 -
GROWING TRAFFIC LOAD CITED. INSPECTOR MUGGERIDGE SAYS STREET WIDENING MUST BEGIN 'BEFORE IT'S TOO LATE.'

AA 4 -
OVERLOADING OF AGED SEWER LINES BRINGS DEMANDS FOR IMMEDIATE EXPANSION OF SANITARY SEWER CAPACITY.

AA 8 -
STORM CAUSES BASEMENT FLOODING IN SEVERAL-BLOCK AREA AS STORM SEWERS OVERFLOW. ACTION DEMANDED NOW TO EXPAND CAPACITY.

AA 3 -
RECORD RAINFALL FLOODS AREA. EXPANSION OF LOCAL STORM SEWER SYSTEM NEEDED.

AA 4 -
WATER PRESSURE DEFLATED BY RAPIDLY-INCREASING USE.MAY HAMPER FIRE-FIGHTING EFFORTS UNLESS WATER MAINS ARE EXPANDED SOON.

AA 3 -
WATER MAIN EXPANSION NECESSARY TO MAINTAIN WATER PRESSURE PROGRESSIVELY LOWERED BY INCREASED USE OF AIR CONDITIONING.

AA 2 -
WATER MAINS BURST THREE TIMES IN TWO MONTHS. RESIDENTS. UNDERSTANDABLY IRRITATED. DEMAND 'LASTING' MAJOR REPAIRS.

AA 6 -
'PARKS ARE NEEDED WHERE PEOPLE ARE--BUSING PEOPLE OUT OF THE CITY ISN'T FEASIBLE.' CLAIMS RESIDENT GROUP IN PETITION.

AA 8 -
SHELTER HOUSE PROPOSED FOR PARK. LOCAL CITIZENS COMPLAIN CONSTANTLY ABOUT POOR PICNIC FACILITIES.

AA 1 -
CITY YOUTH DEMANDS NEW PLAY FIELD EQUIPMENT. OFFICIALS HOWEVER CITE WHOLESALE THIEVERY AND IMPLY YOUTHFUL RACKETEERING.

SUBURB. JURISDICTION 2 b

AA 10 -
HOMEOWNERS ASSOCIATIONS DEMAND CITY TAKE IMMEDIATE ACTION TO RESURFACE WINTER-DAMAGED NEIGHBORHOOD STREETS.

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AA 19 -
POORLY-CONSTRUCTED SANITARY SEWER SYSTEM CAUSES UNPLEASANT BLOCKAGES. RESIDENTS ARE CALLING FOR REPLACEMENT.

AA 19 -
TASTE OF WATER IS MAKING AREA RESIDENTS SICK. ONLY PERSON BENEFITING IS THE LOCAL CULLIGAN MAN.

AA 19 -
PARENTS GROUP WANTS LOCAL SWIMMING POOL SO CHILDREN WILL KEEP OFF STREETS ON HOT DAYS.

         T O W N S H I P   1  (JUR. 3)     b
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AA 27 -
SAFETY SIGNAL INSTALLATION NECESSARY TO HALT INCREASING PEDESTRIAN ACCIDENTS AT BUSY SHOPPING CENTER INTERSECTION.

AA 23 -
AUTO INDUSTRY HOLDS KEY TO NATIONS FUTURE SAYS CHAMBER OF COMMERCE. PRESSURES POLITICIANS TO BUILD MORE PRIMARY STREETS.

AA 24 -
STORM SEWER EXTENSION DEMANDED BY IRATE CITIZENS. MILDEST SHOWERS TURN UNIMPROVED LOCAL STREETS INTO SOUPY QUAGMIRES.

AA 20 -
THREE FEET OF WATER INUNDATE LOCAL STREETS.ONLY LARGE-SCALE STORM SEWER CONSTRUCTION WILL PREVENT FURTHER OCCURRENCES.

AA 23 -
LOCAL CITIZENS HOPEFUL ABOUT GETTING WATER MAIN EXPANSION. PATIENCE WORN BY MANY DELAYS MAKES IT PRIME POLITICAL ISSUE.

AA 24 -
YOUNG ROWDIES INTIMIDATE TODDLERS IN LOCAL PARK. MOTHERS DEMAND CONSTRUCTION OF INDEPENDENT TOT LOTS.

         T O W N S H I P   2  (JUR. 4)     b
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AA 21 -
STEADILY-INCREASING TRAFFIC FLOW ON PRIMARY THOROUGHFARE IN THE AREA UNDERSCORES NEED FOR WIDENING.

AA 16 -
NEW PRIMARY ROAD PUSHED BY RESIDENT GROUP TO AID COMMUTER CONGESTION PROBLEMS.

AA 22 -
DEVELOPERS CALL UPON CITY TO EXTEND LOCAL SANITARY SEWER MAINS TO AREA RIPE FOR DEVELOPMENT. NEW TRUNKLINES NEEDED.

AA 22 -
BASEMENTS FLOODED AND SLAB FOUNDATIONS ERODED AS RAINS OVERFLOW STORM SEWERS. INCREASED CAPACITY CONSIDERED MANDATORY.

AA 14 -
WATER FACILITIES FAIL TO PACE URBAN GROWTH AND PRIVATE WELLS ARE NOT RELIABLE. MAJOR WATER MAIN CONSTRUCTION URGENT.

AA 15 -
COST-BENEFIT SHOWS FOLLY OF PUBLIC ICE SKATING RINK BUT COMMUNITY GROUP CONTINUES TO PRESS ITS DEMANDS ON POLITICIANS.

B U S I N E S S   P A G E   b
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   g  NEW FIRMS PLANNING TO COME TO A.P.E.X. AREA
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SUPER CRACKERS INC              (EXOFIRM NO.  4) PREFERS LOCATION IN ANALYSIS AREAS 10 25 17. WILL USE  8.80 ACRES.
        WILL HAVE 200 EMPLOYEES AND WILL ADD  57200C. DOLLARS TO THE TAX BASE.
        POLITICIANS NOTE-- REZONING NEEDED TO V-4 (VACANT INDUSTRIAL).
                           STREETS COSTING 35000. DOLLARS ARE NEEDED.
        REQUIRES INVESTMENT OF AT LEAST $ 200000. BY LOCAL BUSINESSMEN.
ZIPPY FROZEN FOODS INC FREEZER  (EXOFIRM NO.  8) PREFERS LOCATION IN ANALYSIS AREAS  5  6 24. WILL USE  3.00 ACRES.
        WILL HAVE  90 EMPLOYEES AND WILL ADD  195000. DOLLARS TO THE TAX BASE.
        POLITICIANS NOTE-- STREETS COSTING 35000. DOLLARS ARE NEEDED.
        REQUIRES INVESTMENT OF AT LEAST $  25000. BY LOCAL BUSINESSMEN.
NAIL-ADS PRINTERS               (EXOFIRM NO. 12) PREFERS LOCATION IN ANALYSIS AREAS  0  0  0. WILL USE  1.50 ACRES.
        WILL HAVE 180 EMPLOYEES AND WILL ADD  300000. DOLLARS TO THE TAX BASE.
        POLITICIANS NOTE-- REZONING NEEDED TO V-4 (VACANT INDUSTRIAL).
        REQUIRES INVESTMENT OF AT LEAST $  25000. BY LOCAL BUSINESSMEN.
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